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MASSACHUSETTS DEPARTMENT OF EDUCATION

MCAS

MASSACHUSETTS
COMPREHENSIVE
ASSESSMENT
SYSTEM

The Massachusetts Comprehensive Assessment System:

Release of May 1998 Test Items

426 2/04

Massachusetts Department of Education

Massachusetts Department of Education

This document was prepared by the Massachusetts Department of Education.
David P. Driscoll, Commissioner of Education

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Commissioner's Foreword

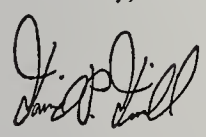
Dear Colleagues:

As you know, the state's new testing program, the Massachusetts Comprehensive Assessment System (MCAS), was administered for the first time in May 1998. This new testing program is based exclusively on the rigorous academic learning standards contained in the Massachusetts *Curriculum Frameworks*. These *Frameworks* and the MCAS program have been developed with the direct and active involvement of educators from across Massachusetts and with the support of the Board of Education. I am proud of our work in developing this critical new program that is designed to raise the academic achievement of all students of the Commonwealth.

The purpose of this document is to share actual items from the May 1998 administration of MCAS with educators and the public. The release of these items provides considerable additional information regarding the kinds of knowledge and skills that students are expected to demonstrate on the MCAS tests. Local educators will be able to use this document in concert with their school's *Test Item Analysis Reports* to identify strengths and weaknesses in curriculum and instruction, and to guide the changes necessary to more effectively serve students.

You will find this document on the Internet at www.doe.mass.edu. Please note that, due to some publishers' restrictions on copyright permissions regarding materials included in the MCAS tests, the paper version of this document contains some MCAS test materials that are not included on the Internet version.

Sincerely,



David P. Driscoll
Commissioner of Education

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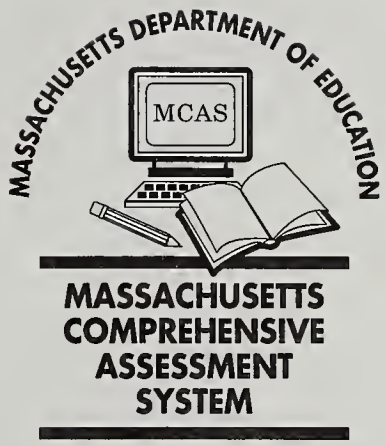

I. Introduction

Massachusetts Department of Education

I. Introduction

Overview of MCAS Test Items

In May 1998, the new Massachusetts Comprehensive Assessment System (MCAS) was administered for the first time to public school students in grades 4, 8, and 10 across the Commonwealth. MCAS was developed in response to the Education Reform Law of 1993 and is designed to promote high academic standards for all public school students across the Commonwealth by measuring student performance based on clear, uniform, statewide standards for content knowledge and skills.

May 1998 Content Areas Tested

In May's first MCAS administration, students were tested in the content areas of English Language Arts, Mathematics, and Science & Technology. They answered questions that were based exclusively on the learning standards defined in the Massachusetts *Curriculum Frameworks* for these three content areas.[1] The questions assessed students' content knowledge and skills in these areas; because questions focused on learning standards identified for **all grades up to and including** the tested grade level, students were required to demonstrate cumulative content knowledge and skills on most MCAS questions.

Types of Questions

Four different types of questions (items) appear on MCAS:

- multiple-choice questions
- short-answer questions
- open-response questions
- writing prompts

Multiple-choice questions require students to select the correct answer from a list of four options.

Short-answer and **open-response** questions require students to generate, rather than recognize, a response. **Short-answer** questions require a brief response (for example, a short statement or computation leading to a numeric solution) and were presented only in the Mathematics sessions of MCAS in May 1998. **Open-response** questions require a one- or two-paragraph response in writing or in the form of a chart, table, diagram, or graph, as appropriate.

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[1] See footnotes at the beginnings of chapters II through X for specific *Framework* references. Some learning standards, including all learning standards in the *English Language Arts Framework's Media* strand, cannot be assessed using the MCAS large-scale paper-and-pencil format and are therefore not tested by MCAS.

During May 1998 MCAS English Language Arts sessions, students completed two writing assignments (Long Composition and Short Composition) in response to writing prompts, some of which related to reading passages.

Common Items/Matrix Items

Each student is issued one MCAS Student Test Booklet to use during testing. In May 1998, there were 12 different forms of the Student Test Booklet at each tested grade level (4, 8, and 10). At each grade level, approximately 80% of the items (including the Long Composition writing prompt) in any Student Test Booklet were identical in all 12 forms (common items). Approximately 20% of the items (including the Short Composition writing prompt) varied from form to form (matrix items).[2]

Individual student test scores are based exclusively on common items. Therefore, in the interest of supporting the improvement of statewide student academic performance, the Massachusetts Department of Education intends to release annually all common test items to the public following testing each spring. Released materials will be replaced with new items in the following year's MCAS tests.

The types and number of common test items for each grade in the May 1998 administration of MCAS are shown in Tables 1, 2, and 3 below.

Table 1. May 1998 MCAS
Number of Test Items in Each Content Area by Item Type and Function
Grade 4

Item Type: MC = Multiple-choice Question SA = Short-answer Question OR = Open-response Question WP = Writing Prompt

Item Function	*Content Area*							
	English Language Arts			Mathematics			Science & Technology	
	MC	OR	WP	MC	SA	OR	MC	OR
Common Questions (identical on all 12 Student Test Booklet forms)	28	5	1	21	5	6	26	6
Matrix Questions (differing between the 12 Student Test Booklet forms)	8	3	1	5	1	1	6	1
Total Questions	**36**	**8**	**2**	**26**	**6**	**7**	**32**	**7**

[2] School, district, and state reports of results include data generated from matrix items. Matrix items serve two primary purposes: they are the basis for equating tests from year to year, which allows for longitudinal comparisons of performance; and, using a relatively modest amount of testing time, they efficiently sample a broader range of the curriculum than common items. Student responses to matrix items are aggregated at the school and district levels; those results are combined with common item results to report in subject sub-areas ("reporting categories"). These sub-area results, which are based on common and matrix items, provide an indication of how successfully schools and districts are addressing the breadth of the curriculum areas.

Table 2. May 1998 MCAS
Number of Test Items in Each Content Area by Item Type and Function
Grade 8

Item Type: MC = Multiple-choice Question SA = Short-answer Question OR = Open-response Question WP = Writing Prompt

Item Function	*Content Area*							
	English Language Arts			Mathematics			Science & Technology	
	MC	OR	WP	MC	SA	OR	MC	OR
Common Questions (identical on all 12 Student Test Booklet forms)	28	5	1	21	5	6	26	6
Matrix Questions (differing between the 12 Student Test Booklet forms)	8	3	1	5	1	1	6	1
Total Questions	**36**	**8**	**2**	**26**	**6**	**7**	**32**	**7**

Table 3. May 1998 MCAS
Number of Test Items in Each Content Area by Item Type and Function
Grade 10

Item Type: MC = Multiple-choice Question SA = Short-answer Question OR = Open-response Question WP = Writing Prompt

Item Function	*Content Area*							
	English Language Arts			Mathematics			Science & Technology	
	MC	OR	WP	MC	SA	OR	MC	OR
Common Questions (identical on all 12 Student Test Booklet forms)	32	8	1	27	5	7	30	8
Matrix Questions (differing between the 12 Student Test Booklet forms)	8	2	1	5	1	2	6	2
Total Questions	**40**	**10**	**2**	**32**	**6**	**9**	**36**	**10**

Document Purpose and Structure

Purpose

The purpose of this document is to share with educators and the public all common test items from the May 1998 MCAS Student Test Booklets. Release of these items is intended to provide additional information regarding the kinds of knowledge and skills that students are expected to demonstrate on MCAS. Local educators will be able to use this information to identify strengths and weaknesses in their curriculum and instruction, and to guide the changes necessary to serve their students' needs more effectively.

Correct answers are given in this document for multiple-choice and short-answer questions. An overview of procedures for scoring responses to MCAS open-response questions and writing prompts can be found in the MCAS fact sheet, "Facts on Scoring of Student Answers to Open-Response Questions and Writing Prompts," which is available on the Department's Internet site at **www.doe.mass.edu.** Scoring procedures are also explained further in the MCAS document, *Guide to Interpreting the 1998 MCAS School and District Reports,* which is due for release in late fall 1998.

MCAS test results will be reported through reporting categories specific to each content area. These reporting categories and their related Massachusetts *Curriculum Framework* learning standard(s) are listed at the beginning of each subsequent chapter of this document; test items are later linked to their related reporting categories/learning standards. Certain reporting categories/learning standards were not tested by MCAS common questions in 1998, but were tested by MCAS matrix questions; these categories/standards are also included in this document.

This document does **not** report 1998 MCAS test results. Test results for individual students, schools, and school districts will be reported in late fall 1998. (See the section below titled "**Using this Document with the *Test Item Analysis Report***" for a general description of how the information given in this document supports the use of that report.)

Structure

Chapters II through X of this document each contain information for one grade level (4, 8, or 10) and content area (English Language Arts, Mathematics, and Science & Technology). The first section of each chapter lists the MCAS reporting categories under which school and district results are reported, with their related *Framework* learning standards, and identifies applicable *Framework* page numbers. The second section of each chapter contains the common test items from the May 1998 MCAS administration. Each test question is followed by a reference to the reporting category under which its results are reported and the page(s) of this document where that reporting category may be found.

Most test items are presented in this document in the same order as in the MCAS Student Test Booklets. However, there are a few exceptions: in English Language Arts, open-response questions in this document follow the readings with which they are associated; in Mathematics and Science & Technology, all questions of the same type (multiple-choice, short-answer, or open-response) are grouped together in this document. The heading for each group of items indicates the number of the May 1998 MCAS test session within which those items appeared. Questions in this document have ***not*** been formatted exactly as they appeared on MCAS.

To supplement the chapters of this document containing the common Mathematics test items for each grade (chapters V, VI, and VII), copies of the grade 4 Mathematics Tool Kit and the grades 8 and 10 Mathematics Reference Sheets used by students during the May 1998 Mathematics sessions are provided in Appendix A.

Using this Document with the *Test Item Analysis Report*

Reports of student test results will be released in late fall 1998 to individual students, to schools, and to school districts. One of the reports issued to schools will be the *Test Item Analysis Report.* Each school will receive multiple *Test Item Analysis Reports:* one for each content area at each grade level tested (e.g., Grade 10 English Language Arts).

The *Test Item Analysis Report* summarizes data generated from student responses to common questions only.[3] The report lists, for the school receiving the report, the names of all students in the tested grade, and shows how each student answered each common question in that content area. The report identifies whether each question was multiple-choice, short-answer, open-response, or a writing prompt, and identifies the question's MCAS reporting category. Question numbers in this document correlate directly to the "Item Numbers" in the *Test Item Analysis Report.*

[3] All reports of MCAS results, except as noted below, include data generated from responses to common questions only; in the *School Report* and the *District Report,* only the *Subject Area Subscore* sections include data generated from responses to common and matrix questions combined.

Additional Information on MCAS

Related Department Publications

This document is available on the Department of Education's Internet site at www.doe.mass.edu. However, due to copyright release issues, the Internet version of this document does not include the English Language Arts Readings found in chapters II, III, and IV.

The following publications, as well as other Department publications, may also be found on the Department's website. Most are also available at your local public library.

- *English Language Arts Curriculum Framework* (February 1997)
- *Mathematics Curriculum Framework: Achieving Mathematical Power* (January 1996)
- *Science & Technology Curriculum Framework: Owning the Questions Through Science & Technology* (January 1996)
- *Guide to the Massachusetts Comprehensive Assessment System: English Language Arts* (February 1998)
- *Guide to the Massachusetts Comprehensive Assessment System: Mathematics* (January 1998)
- *Guide to the Massachusetts Comprehensive Assessment System: Science & Technology* (January 1998)
- *The Massachusetts Comprehensive Assessment System: Requirements for the Participation of Students with Disabilities [A Guide for Educators and Parents]* (March 1998)
- *The Massachusetts Comprehensive Assessment System: Requirements for Test Scheduling, Student Participation, and Test Security and Ethics* (April 1998)
- *The Massachusetts Comprehensive Assessment System: Release of May 1998 Test Items* (October 1998)
- *Question and Answer Guide on the Statewide Testing Program* (February 1998)
- *A Student's Question and Answer Guide on the Statewide Testing Program* (April 1998)

MCAS Support Services

For further information about the Massachusetts Comprehensive Assessment System, please contact MCAS Support Services at

(800) 737-5103

or call, write, fax, or e-mail

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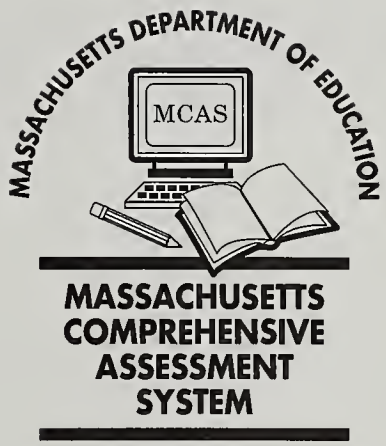


II. English Language Arts, Grade 4

Massachusetts Department of Education

Curriculum Framework *Learning Standards/ MCAS Reporting Categories*

English Language Arts, Grade 4

The learning standards in this section are quoted directly from the Massachusetts *English Language Arts Curriculum Framework*.[1] The English Language Arts section of MCAS was based on three content strands defined in the *Framework:*[2]

- *Language*
- *Literature*
- *Composition*

These three content strands also serve as MCAS reporting categories. *Framework* learning standards are grouped below under their related MCAS reporting category. Applicable *Framework* page numbers are given in parentheses following each heading.

Each Common Item in the second section of this chapter is followed by a reference to the **learning standard** to which it is related.

Language (*Framework*, pp. 28–31)

Learning Standard 4

Students will acquire and use correctly an advanced reading vocabulary of English words, identifying meanings through an understanding of word relationships.

Learning Standard 5

Students will identify, describe, and apply knowledge of the structure of the English language and standard English conventions for sentence structure, usage, punctuation, capitalization, and spelling.

Learning Standard 6

Students will describe and analyze how oral dialects differ from each other in English, how they differ from written standard English, and what role standard American English plays in informal and formal communication.

Learning Standard 7

Students will describe and analyze how the English language has developed and been influenced by other languages.

---

[1] Massachusetts Department of Education, *English Language Arts Curriculum Framework* (Malden, 1997).

[2] Some *Framework* learning standards, including all learning standards in the *Media* content strand, cannot be assessed using the MCAS large-scale paper-and-pencil format and are therefore neither tested by MCAS nor included in this document.

Literature (*Framework*, pp. 38–50)

Learning Standard 8

Students will decode accurately and understand new words encountered in their reading materials, drawing on a variety of strategies as needed, and then use these words accurately in . . . writing.

Learning Standard 9

Students will identify the basic facts and essential ideas in what they have read, heard, or viewed.

Learning Standard 10

Students will identify, analyze, and apply knowledge of the characteristics of different genres.

Learning Standard 11

Students will identify, analyze, and apply knowledge of theme in literature and provide evidence from the text to support their understanding.

Learning Standard 12

Students will identify, analyze, and apply knowledge of the structure and elements of fiction and provide evidence from the text to support their understanding.

Learning Standard 13

Students will identify, analyze, and apply knowledge of the structure, elements, and meaning of nonfiction or informational material and provide evidence from the text to support their understanding.

Learning Standard 14

Students will identify, analyze, and apply knowledge of the structure, elements, and theme of poetry and provide evidence from the text to support their understanding.

Learning Standard 15

Students will identify and analyze how an author's choice of words appeals to the senses, creates imagery, suggests mood, and sets tone.

Learning Standard 16

Students will compare and contrast similar myths and narratives from different cultures and geographic regions.

Learning Standard 17

Students will interpret the meaning of literary works, nonfiction, films, and media by using different critical lenses and analytic techniques.

Composition (*Framework,* pp. 56–60)

Learning Standard 19

Students will write compositions with a clear focus, logically related ideas to develop it, and adequate detail.

Learning Standard 20

Students will select and use appropriate genres, modes of reasoning, and speaking styles when writing for different audiences and rhetorical purposes.

Learning Standard 21

Students will demonstrate improvement in organization, content, paragraph development, level of detail, style, tone, and word choice (diction) in their compositions after revising them.

Learning Standard 22

Students will use knowledge of standard English conventions to edit their writing.

MCAS May 1998 Common Test Items

English Language Arts, Grade 4

Number of Sessions

MCAS Student Test Booklets included 7 separate English Language Arts test sessions. Sessions 1, 4, and 5 included selected readings, followed by multiple-choice and open-response questions. All items in these sessions were common items. During Sessions 3A and 3B, which took place on the same day with a short break in between, students wrote a composition (the "Long Composition") in response to a common writing prompt given in Session 3A. Sessions 2 and 6 were not common to all Student Test Booklets, and their content is therefore not included in this document.

Formatting in This Document

Materials in this document are shown in the same order in which they were presented in Student Test Booklets, with the exception that open-response questions are shown following the reading to which they are related. The session in which each reading or group of questions appeared is identified preceding the reading or question group.

Materials are not formatted exactly as they appeared in Student Test Booklets. For instance, in order to present items most efficiently in this document, the following modifications have been made:

- Some fonts and/or font sizes have been changed and/or reduced.
- Some graphics which appeared above questions in Student Test Booklets are shown instead to the side.
- Most graphics have been reduced in actual size from but maintain the same proportions as those that appear in Student Test Booklets.

Correct Answers

Correct answers for **multiple-choice questions** are shown in **bold** and indicated by a check mark.

An overview of procedures for scoring responses to MCAS **open-response questions** and **writing prompts** can be found in the MCAS fact sheet, "Facts on Scoring of Student Answers to Open-Response Questions and Writing Prompts," which is available on the Department's Internet site at **www.doe.mass.edu.** Scoring procedures are also explained further in the MCAS document, *Guide to Interpreting the 1998 MCAS School and District Reports,* which is due for release in late fall 1998.

Reference Materials and Tools

During Sessions 3A and 3B **only,** at least one dictionary per classroom was provided for student use. No other reference tools or materials were allowed during Sessions 3A or 3B, or during any other English Language Arts testing session.

Reading Selection #1, Session 1

In the selection below, a young girl named Anastasia Krupnik has a surprise for her mother. Read the story to learn about the surprise. Then answer the questions that follow.

From Chapter 1 of *Anastasia*

by Lois Lowry

"Mom!" shouted Anastasia as she clattered up the back steps and into the kitchen after school. "Guess what Meredith Halberg gave me! Just what I've been wanting! And it didn't cost *anything!"*

Mrs. Krupnik put a casserole into the oven, closed the oven door, and adjusted the temperature. She turned around. "Let me think," she said. "Chicken pox?"

Anastasia made a face. It was terrible, having a mother who always made jokes. "Ha ha, very funny," she said. "I said it was something I'd been *wanting.* Anyway, I had chicken pox years ago."

"Well," said her mother, "I can't think of anything else that doesn't cost anything."

Anastasia was so excited she was almost jumping up and down. "You'll never guess! Wait, I'll show you. They're on the back porch. They're probably getting cold. I'll bring them in."

"Hold it," her mother said. She looked suspicious. "What do you mean, they're getting cold? It's not something *alive,* is it?"

But Anastasia had already gone, banging the door behind her. In a minute she was back, holding a wooden box with a wire mesh cover over it. A rustling sound came from the inside of the box.

Her mother retreated instantly, behind the kitchen table. "No!" she said. "I've told you and told you that I can't stand —"

Anastasia wasn't listening. Her mother was so boring sometimes.
She undid the latch and lifted the cover of the box.

"Gerbils!" she announced with delight.

Her mother backed away until she was against the refrigerator. She picked up a wooden spoon and held it like a weapon. "GET THOSE THINGS OUT OF MY KITCHEN IMMEDIATELY!" she bellowed.

"But, Mom, look how cute they are —"

"I SAID, OUT OF MY KITCHEN!"

Grouchily, Anastasia covered the box again. She took it to the back hall.

"Mom," she said when she returned, "you can open your eyes now. They're in the back hall."

Her mother sat down and took some deep breaths. She looked around warily. "Anastasia," she said, "you know I can't stand rodents."

"Mom, they're sweet, furry little —"

"Rodents." Her mother shuddered.

Multiple-choice Questions, Session 1

1. Why was Anastasia so excited about the gerbils?

   A. They did not cost her anything.

   B. She needed them for a science project.

   C. She knew they would scare her mother.

   ✔ **D. She had wanted gerbils for a long time.**

Related Learning Standard for Question 1: **Learning Standard 9 (p. 14)**

2. Why is "GET THOSE THINGS OUT OF MY KITCHEN IMMEDIATELY" in capital letters?

   ✔ **A. to make the words stand out and seem louder**

   B. because they are someone's exact words

   C. because there is an exclamation point at the end

   D. to show that her mother only thought them in her mind

Related Learning Standard for Question 2: **Learning Standard 15 (p. 14)**

3. What is the most important problem Anastasia has to solve at the end of the story?

   ✔ **A. how to persuade her mother to let her keep the gerbils**

   B. how to pay Meredith Halberg for her new pets

   C. how to keep the gerbils in their cage

   D. how to clean up the gerbils' nest

Related Learning Standard for Question 3: **Learning Standard 12 (p. 14)**

Open-response Question, Session 1

4. What kind of a person is Anastasia? Use information from the story in your answer.

Related Learning Standard for Question 4: **Learning Standard 12 (p. 14)**

Reading Selection #2, Session 1

In this passage you will learn what amber is, how it was created, and about its uses. Read the passage and then answer the questions that follow.

Amber

The Forty-Million-Year-Old Trap

by Marjorie Jackson

1 Forty million years ago, when the earth was much wetter and warmer, huge forests with many kinds of trees thrived in the far north. Out of some of these trees, stretching as tall as ten-story buildings, oozed a sticky resin. Mosquitoes buzzed through the forests, grasshoppers and crickets leaped, and ants and spiders scurried by the trees in search of food. If they carelessly let a leg or wing touch the resin—*zap!*—they were stuck, preserved like mummies in an airtight trap.

2 Millions of years passed, and the climate of the earth altered dramatically. The northlands turned cold and icy. The giant trees fell, buried under the salt water that now covered the land. Far beneath the water, the globs of resin slowly changed, hardening into solid, glowing pieces of amber.

3 Still millions of years later, storms at sea broke the amber free and tossed it onto beaches for early cave dwellers to find. The cave dwellers wondered if the strange golden stone, warm to the touch, could be solid sunlight. Using flint and bone tools, they carved pieces of amber into the shapes of animals or the sun and wore them on cords around their necks for magical protection. When early Chinese people found amber the color of tigers' stripes, they believed it held the souls of dead tigers and they treasured it as a source of courage.

4 . . . For hundreds of years, people used amber in jewelry or to decorate warriors' weapons: some soldiers braided amber beads in their horses' manes to ensure success in battle. Amber was also ground fine and mixed with honey, oil of roses, and crabs' eyes or claws for use as medicine. Amber mixtures were believed to cure earaches, headaches, and any number of diseases. Even wearing buttons or beads carved from amber was thought to keep a person well. As amber became more valuable, sea traders making money on the precious commodity protected their trade routes by inventing stories about giant serpents, evil sea witches, and other terrors of sailing in search of the golden substance.

5 . . . Some pieces of amber have air bubbles inside that keep the light from passing through, making it look cloudy, but many others are clear like glass. The pieces of amber with inclusions of early life or gas bubbles are the most valuable to scientists. They hold clues about the earth's ecology millions of years ago and enable scientists to compare early life forms with today's. More than a thousand kinds of insects have been found preserved in amber, from prehistoric flies that proved to be the ancestors of our houseflies to a 140-million-year-old weevil that lived at the time of the dinosaurs. Whole flights of insects were sometimes trapped in one glob of resin; one two-inch piece of amber has 2,000 ants in it! Although most of the preserved insects are now extinct, their descendants may still survive, sometimes in new places. A termite found in Mexican amber now lives only in Australia.

6 Scientists use x-rays to study skeletons of frogs and lizards, seeds inside fruit, and other inclusions without opening the amber. They also scan the surface of ancient mummified insects with electron microscopes, revealing such detail as preserved muscle fibers and the spinning glands of trapped spiders. In addition, scientists can extract DNA directly from an amber inclusion. Amber is the only known fossil from which ancient DNA can be recovered.

7 Many natural history museums have pieces of amber on display. Look for them during your next visit. These golden traps, 40 or more millions of years old, are the closest thing we have to snapshots of our ancient past.

Multiple-choice Questions, Session 1

5. Amber is formed over time from

   A. wood from a tree.

   B. insects.

   ✔ C. **a sticky resin.**

   D. salt water.

Related Learning Standard for Question 5: **Learning Standard 9 (p. 14)**

6. Which of the following would be a good topic sentence for paragraph 4?

   ✔ A. **Amber had many uses and became quite valuable.**

   B. Amber was used for jewelry.

   C. Amber was thought to be a magical substance.

   D. Amber's golden glow pleased people.

Related Learning Standard for Question 6: **Learning Standard 13 (p. 14)**

7. The author calls amber pieces that contain prehistoric life "snapshots of our ancient past." She means that they show

   A. life that only lasted for a few seconds.

   ✔ B. **past life forms as they really looked.**

   C. animals, plants, and insects in natural settings.

   D. photographs of ancient life.

Related Learning Standard for Question 7: **Learning Standard 8 (p. 14)**

8. Which would be the BEST picture to go along with the last three paragraphs?

   ✔ A. **a drawing of a prehistoric fly**

   B. a drawing of an electron microscope

   C. a photograph of a human muscle fiber

   D. a photograph of a Mexican termite mound

Related Learning Standard for Question 8: **Learning Standard 13 (p. 14)**

Open-response Question, Session 1

9. Starting with an ant climbing up a tree 40 million years ago, tell the story of how the ant might have ended up in a piece of amber. Use information from the passage in your answer.

Related Learning Standard for Question 9: **Learning Standard 9 (p. 14)**

Reading Selection #3, Session 1

In 1911, the author's father came up with an invention that helped a doctor to solve a big problem. Read the story to learn about the invention and then answer the questions that follow.

"Swat the Fly!"
The Birth of the Fly Swatter

by Bob Rose

It was the bottom of the ninth inning, and the score was tied at 2 to 2. Wichita was in the field, and Topeka had a runner on third and one out.

1 Excited fans began yelling, "Sacrifice fly! Sacrifice fly!" The batter swung at the next pitch—and missed. The chanting grew to a roar and changed to, "Swat that ball! Swat that ball!"

Dr. Samuel Crumbine, head of the Kansas State Board of Health, was in the stands. All at once he pulled an envelope from his pocket and quickly

2 scrawled "Swat the Fly" on it. Then he rushed back to his office without even waiting to see who won the game!

All that was on his mind was the next copy of the Fly Bulletin. Soon

3 people all over Topeka saw fliers and posters with the words SWAT THE FLY.

Since 1906 Dr. Crumbine had worked to limit the spread of the deadly disease typhoid. Typhoid epidemics were common in those years, and the doctor was convinced that flies were the culprits. Few houses had window

4 screens, and the windows were usually left open to let in cool air. He believed the flies transmitted the disease when they flew from the outhouses and landed on the food on the kitchen tables.

Dr. Crumbine racked his brain for months to figure out a way to get rid of the insects. He handed out fliers warning of the dangers of typhoid and flies,

5 but few people paid attention. One day Dr. Crumbine decided to cheer himself up by going to a baseball game. When he heard the crowd chanting, he knew he had the solution.

Newspapers picked up the slogan "Swat the Fly" and over the next few months it traveled all over Kansas. My dad, Frank H. White, was a

6 schoolteacher and Scout-master in Weir City, Kansas. He read about Dr. Crumbine's campaign and got an idea.

He bought some wooden yard-sticks and wire screen. Then he had his Boy Scouts saw the yardsticks in half, cut the screen in small squares, and nail

7 each piece to the yardsticks. The Scouts called them "fly bats," and they gave two fly bats to every house in town for Dr. Crumbine's "Swat the Fly" campaign.

Right after this, my dad presented Dr. Crumbine with one of the fly bats.
8 The doctor instantly saw what a great idea it was, but he wasn't sure about the name. Then he remembered the baseball game. With a smile, the doctor said, "Let's call it a fly swatter."

The popularity of both the slogan and the new invention quickly spread across the country and eventually around the world. Many believe the fly
9 swatter was instrumental in decreasing the spread of fly-borne diseases such as typhoid and cholera.

The success of the campaign helped make Dr. Crumbine famous. From
10 then on, he was known to doctors everywhere as "Swat the Fly" Crumbine.

SWAT THE FLY!

Multiple-choice Questions, Session 1

10. This story would be a good one to put in a book about

    A. baseball.

    B. Boy Scouts.

    ✔ C. inventions.

    D. newspapers.

Related Learning Standard for Question 10: **Learning Standard 9 (p. 14)**

11. "Typhoid epidemics were common in those years, and the doctor was convinced that flies were the culprits." The word *culprits* means

    A. winged insects.

    B. the ones people didn't like.

    ✔ C. the ones to blame.

    D. the worst pests.

Related Learning Standard for Question 11: **Learning Standard 8 (p. 14)**

12. The picture on Dr. Crumbine's fly bulletin was MOST LIKELY chosen to

    ✔ A. get people's attention so they would read the bulletin.

    B. show many different ways to kill a fly.

    C. show what flies look like.

    D. show people that flies are harmless.

Related Learning Standard for Question 12: **Learning Standard 13 (p. 14)**

Writing Prompt, Sessions 3A and 3B, Long Composition

13. Write a LETTER to a third-grader about your experience in the fourth grade. Describe fourth grade so that someone who will be in fourth grade next year will know what to expect.

Related Learning Standards for Question 13: **Learning Standards 19, 20, 21, and 22 (p. 15)**

Reading Selection #1, Session 4

In the following two selections, you will learn about some events from early American history. "Hoodwinked" is the story of a clever and courageous young patriot; the poem "Molly Pitcher" tells about an actual heroine of the Revolutionary War. Read the story and the poem and then answer the questions that follow.

★ Hoodwinked ★

by Nell Leech

1 On a September morning in 1813, Rebecca Bates ran down the steps of Cedar Point Lighthouse on Cape Cod and stood for a moment on the dock, looking out to sea. She shaded her eyes against the brilliance of the sky as she squinted at a faint blur of sail on the horizon.

2 America was at war for the second time with Great Britain, and the British navy's sea blockade was gradually extending to the New England coast. Rebecca knew that the outline of a ship could mean either an enemy vessel approaching or an American privateer running for home. Yankee skippers had found their vessels could run circles around the heavy British ships and they delighted in taunting the enemy, then racing back to the shore.

3 "I see a ship, Father!" Rebecca called, as she hurried up the steps to rejoin her father in the watchtower.

4 "Aye, but it's some miles away, daughter," he said. He reached for his telescope, and they walked onto the balcony around the top of the lighthouse.

5 Simon Bates scanned the horizon through his spyglass. After a few minutes, he clicked it shut. He sounded relieved. "She's a Britisher—but she's heading away to the northeast. There's nothing for us to fear."

6 Rebecca was a big, strong girl who looked much older than her fourteen years. Responsibility had fallen to her early when her mother died. She kept their little stone house clean and neat; her younger sister and brother thrived under her care; she was a great help to her father in his exacting tasks as keeper of the lighthouse.

7 But today, Simon Bates was disturbed. He had to go to Scituate, the nearest settlement, for food supplies, and it would be dusk before he got home. While there was no longer any danger from local Indians, there was plenty of trouble at sea. The blockade was tightening. The British were not only preventing Yankee privateers from leaving the harbor, they were also capturing them on their way back to their home ports.

8 Noticing her father's uneasy expression, Rebecca put out a comforting hand. "Don't worry about us, Father. We shall be all right. Look, the ship has disappeared."

9 Young Simon and his sister, Arvilla, followed their father to the water's edge. They skipped around in excitement as he untied the small wooden boat and cast off. The sturdy little craft leaped over the incoming waves, and Simon Bates, pulling hard on the oars, disappeared round the Point.

10 Toward noon, a ship appeared round the Point. Rebecca sat up with a jerk. From its short hull and tall masts she recognized the same British frigate she had seen earlier, a fast-sailing fighter with 30 or more guns. It was much closer to the shore this time. Presently, the frigate dropped anchor.

At first, Rebecca was not alarmed. Surely, there was nothing on this barren shore to attract a landing party. She hastened for her father's spyglass. Through it she could see a group of officers conferring on the quarterdeck. Sailors scurried about the
11 lower decks. Her heart sank as she watched the longboat being lowered and filled with armed Redcoats. Then, the well-trained British tars began to row with firm, rhythmic strokes towards the shore.

Rebecca's brain worked fast. She called the two younger children, and they
12 scurried back to the house.

"Simon, you run towards Scituate for help. Tell everyone that the British are
13 landing."

The boy began to run before Rebecca finished. Rebecca gathered up a fife and
14 drum from the chimney corner. Both sisters were experts at playing the lively "Yankee Doodle Dandy," and they did so almost every day.

15 The girls ran from the house to the low ground behind the dunes.

"Quick, Arvilla, here's your fife. Play 'Yankee Doodle' as loud as you can while I
16 drum, and keeping moving all the time," directed Rebecca.

The girls marched backward, then forward, playing the martial music with all
17 their might.

The tune echoed among the sandhills, carrying over the rim of the dunes to the
18 sailors drawing nearer to the beach, and eventually reaching the crew on the frigate.

The coxswain of the longboat was apprehensive. This stretch of the coast had appeared unoccupied, and they had not expected to meet with any resistance. At an
19 order from him, the sailors rested their oars, and the coxswain looked back to the ship for instructions.

Aboard the frigate, the young captain was puzzled. Through his telescope he surveyed the coast, but there was no movement on the glittering sand. Yet the stirring
20 music rose and fell, the beat of a drum persisted. It was possible that a strong American force could be lying in ambush behind those great dunes, ready to pounce on them if they attempted to land.

After consulting with his officers, the captain decided that it would be foolhardy
21 to challenge an unknown and possibly superior force. He ordered a cannon to be fired as a signal for the longboat to return.

Rebecca and Arvilla heard the shot, but they continued to play "Yankee Doodle"
22 defiantly. At any moment they expected the hated Redcoats to come surging over the top of the dunes.

Nothing happened. Everything was still.

Rebecca signaled to her sister to pause. She crept up the side of a sandy hillock
23 and gazed cautiously over the rim, expecting to see a beach filled with British troops. Instead, she shouted in astonishment.

24 "Arvilla, they've gone! We've frightened them away!"

And so the courage and daring of two young girls hoodwinked a band of British
25 sailors and scored a bloodless victory in an uneasy war. ★★★★★

Reading Selection #2, Session 4

Molly Pitcher

'Twas hurry and scurry at Monmouth town,
For Lee was beating a wild retreat;
The British were riding the Yankees down,
And panic was pressing on flying feet.

★

Galloping down like a hurricane
Washington rode with his sword swung high,
Mighty as he of the Trojan plain
Fired by a courage from the sky.

★

"Halt, and stand to your guns!" he cried.
And a bombardier made swift reply.
Wheeling his cannon into the tide,
He fell 'neath the shot of a foeman nigh.

★

Molly Pitcher sprang to his side,
Fired as she saw her husband do.
Telling the king in his stubborn pride
Women like men to their homes are true.

★

Washington rode from the bloody fray
Up to the gun that a woman manned.
"Molly Pitcher, you saved the day,"
He said, as he gave her a hero's hand.

★

He named her sergeant with manly praise,
While her war-brown face was wet with tears—
A woman has ever a woman's ways,
And the army was wild with cheers.

—Kate Brownlee Sherwood

Multiple-choice Questions, Session 4

14. "Hoodwinked" is an example of

✔ A. historical fiction.

B. a mystery story.

C. a legend.

D. a myth.

Related Learning Standard for Question 14: **Learning Standard 10 (p. 14)**

15. Simon Bates was worried about leaving his children at the lighthouse because

A. of the danger from privateers.

B. the weather looked threatening.

✔ C. of British ships in the area.

D. they might not be able to keep the lamp lit.

Related Learning Standard for Question 15: **Learning Standard 9 (p. 14)**

16. The word *uneasy* in the phrase, "Noticing her father's uneasy expression, Rebecca put out a comforting hand," means

A. puzzled.

B. difficult.

✔ C. worried.

D. sad.

Related Learning Standard for Question 16: **Learning Standard 8 (p. 14)**

17. Why did the British captain decide to withdraw?

A. He saw an American privateer approaching.

✔ **B. He thought there were American soldiers behind the dunes.**

C. He realized that there were children playing on the shore.

D. He feared that the music would bring American soldiers.

Related Learning Standard for Question 17: **Learning Standard 9 (p. 14)**

18. In the poem "Molly Pitcher," the rhyming pattern is

A. every pair of lines rhymes.

B. every other stanza rhymes.

C. every line rhymes.

✔ **D. every other line rhymes.**

Related Learning Standard for Question 18: **Learning Standard 14 (p. 14)**

Open-response Question, Session 4

19. Explain why Rebecca and Molly Pitcher are heroines. Use evidence from the story and the poem to support your answer.

Related Learning Standard for Question 19: **Learning Standard 9 (p. 14)**

Reading Selection #3, Session 4

Many peoples across the world tell stories to explain why things are like they are. Read this Native American Sioux legend and the myth about Demeter on the next page. Then answer the questions [that follow].

Keepers of the Animals
by Joseph Bruchac

How the Fawn Got Its Spots

Long ago, when the world was new, Wakan Tanka, The Great Mystery, was walking around. As he walked, he spoke to himself of the many things he had done to help the four-legged ones and the birds survive.

"It is good," Wakan Tanka said. "I have given Mountain Lion sharp claws and Grizzly Bear great strength. It is much easier now for them to survive. I have given Wolf sharp teeth and I have given his little brother, Coyote, quick wits. It is much easier now for them to survive. I have given Beaver a flat tail and webbed feet to swim beneath the water and teeth which can cut down the trees and I have given slow-moving Porcupine quills to protect itself. Now it is easier for them to survive. I have given the birds their feathers and the ability to fly so that they may escape their enemies. I have given speed to the deer and the rabbit so that it will be hard for their enemies to catch them. Truly it is now much easier for them to survive."

However, as Wakan Tanka spoke, a mother deer came up to him. Behind her was her small fawn, wobbling on weak new legs.

"Great One," she said. "It is true that you have given many gifts to the four-leggeds and the winged ones to help them survive. It is true that you gave me great speed and now my enemies find it hard to catch me. My speed is a great protection, indeed. But what of my little one here? She does not yet have speed. It is easy for our enemies, with their sharp teeth and their claws, to catch her. If my children do not survive, how can my people live?"

"Wica yaka pelo!" said Wakan Tanka. "You have spoken truly; you are right. Have your little one come here and I will help her."

Then Wakan Tanka made paint from the earth and the plants. He painted spots upon the fawn's body so that, when she lay still, her color blended in with the earth and she could not be seen. Then Wakan Tanka breathed upon her, taking away her scent.

"Now," Wakan Tanka said, "your little ones will always be safe if they only remain still when they are away from your side. None of your enemies will see your little ones or be able to catch their scent."

So it has been from that day on. When a young deer is too small and weak to run swiftly, it is covered with spots that blend in with the earth. It has no scent and it remains very still and close to the earth when its mother is not by its side. And when it has grown enough to have the speed Wakan Tanka gave its people, then it loses those spots it once needed to survive.

Reading Selection #4, Session 4

The Greeks told many stories called myths to explain the world around them. Read this Greek myth about a kidnapping and rescue. Then use the information from the Native American legend and the Greek myth to answer the questions that follow.

The Story of Demeter

THE STORY: The earth goddess Demeter had only one daughter, a girl of exceptional loveliness whose happy nature delighted everyone who knew her. Her mother doted on her and, because she knew that many males, both god and human, might be attracted to her and try to take her away, she took exceptionally good care of her.

But a young girl can't always be kept at home, so on an especially warm and enticing morning, Persephone went to pick flowers with some of her friends. She strayed too far into a meadow of narcissus, and was seen by the god of the underworld, Hades, who immediately fell in love with her.

As her friends left her to go back to their homes, he snatched her up and forced her into his bleak carriage, pulled by two huge black horses. He took the crying and protesting young girl to his home in the underworld, where he intended to keep her forever, as queen of his kingdom. But Persephone could not settle down in her new life. She longed for the light, warmth, and happiness she had known. Most of all she longed for her mother, Demeter.

When Persephone did not return home with her friends, Demeter went to search for her. No one seemed to have seen her anywhere. Demeter flew all around the earth, asking everyone who might know, humans and gods, what could possibly have happened to her lost daughter. But, for a whole year, she could not find even one clue. Because she was so desperate and lonely, she forgot to bless the earth and its vegetation. The land, which had been fruitful and blooming, turned into a frozen desert. It was as if there never had been any warmth or light. Humans and gods were upset. But Demeter hardly noticed their pleas to return the earth to its former green and flowering state. She sat wrapped in a dark robe, mourning her daughter. With no crops and no warmth, it looked as if everyone on earth would starve or freeze to death. Zeus looked down and finally decided that he would have to rescue the earth and its inhabitants.

First he sent some of the other gods to Demeter to try to persuade her to take up her role again. But Demeter refused to allow the earth to bear fruit until she had Persephone safely back at home. Finally, Zeus found out where Persephone was and went to see his brother Hades. Hades was ordered to return Persephone to earth immediately. But Hades loved the beautiful, sunny girl and he did not want to give her up. Disobeying Zeus was impossible. however, so he thought of another plan. He gave Persephone a magic fruit, the pomegranate, to eat. He knew that if she ate any of the red seeds she would be forced to return to him for at least part of each year.

Then he allowed Hermes to take Persephone to her mother, who was overjoyed to have her daughter back. Demeter immediately saw to it that the seeds in the ground began to sprout, that the flowers and the trees burst into bloom, and that the sun returned to warm the earth and its people.

But every year in the fall Persephone had to go back to Hades, promising her mother she would be back in four months. The magic of the pomegranate seeds had done its work. And when Persephone left, the earth became cold, the flowers died, and the fruit and grain no longer grew because Demeter again sank back into grief over her absent daughter.

Multiple-choice Questions, Session 4

20. According to the Native American legend, Wakan Tanka could best be described as a

    A. skilled hunter.

    B. chief of a powerful Indian tribe.

    ✔ **C. powerful supernatural being.**

    D. Native American wise man.

Related Learning Standard for Question 20: **Learning Standard 12 (p. 14)**

21. In the Native American legend, Wakan Tanka took away the fawn's scent so

    ✔ **A. it cannot be smelled by hungry animals.**

    B. it cannot be seen by human beings.

    C. it is able to smell animals that might hunt it.

    D. its mother cannot smell it.

Related Learning Standard for Question 21: **Learning Standard 9 (p. 14)**

22. In the myth about Demeter, Hades gave Persephone a magic pomegranate to eat because its seeds would make her

    A. happy to be in the underworld.

    ✔ **B. return to him for part of the year.**

    C. unhappy with Demeter, her mother.

    D. sad about being on Earth.

Related Learning Standard for Question 22: **Learning Standard 9 (p. 14)**

23. In the myth about Demeter, after Hades took Persephone to the underworld, the world turned into a frozen desert because

    A. Zeus was angry with what Hades had done.

    B. Persephone could no longer give Earth sun for its crops.

    C. Hades would not allow Persephone to return for a year.

    ✔ **D. Demeter would not bless Earth with sun until her daughter was returned.**

Related Learning Standard for Question 23: **Learning Standard 9 (p. 14)**

Open-response Question, Session 4

24. Think about the two passages you have just read, "How the Fawn Got Its Spots" and "The Story of Demeter." How are old Sioux legends and ancient Greek myths alike? How are they different? Use the two passages you just read to help you answer.

Related Learning Standard for Question 24: **Learning Standard 16 (p. 14)**

Reading Selection #1, Session 5

Use the dictionary page below to answer multiple-choice questions 25 through 27.

mason A person whose work is building with stone, bricks, or concrete.
ma·son (mā′sən) *noun, plural* **masons.**

masquerade A party at which masks and costumes are worn.
mas·quer·ade (mas′kə rād′) *noun, plural* **masquerades.**

mass **1.** A body of matter that has no particular shape. A *mass* of snow piled up along the fence. **2.** A large quantity or number. A *mass* of people showed up for the football game. **3.** Size or bulk. An elephant has great *mass.* **4.** The main or larger part. The *mass* of voters turned out for the election. **5.** The quantity of matter that a body contains. *Noun.*
—To gather or form into a mass. The police *massed* the crowds along the sidewalk so that the parade could pass through. *Verb.*
mass (mas) *noun, plural* **masses;** *verb,* **massed, massing.**

Mass The main religious ceremony in the Roman Catholic Church and certain other churches.
Mass (mas) *noun, plural* **Masses.**

Massachusetts A state in the northeastern United States. Its capital is Boston.
Mas·sa·chu·setts (mas′ə chōō′sits) *noun.*

▲ **Massachusetts** was the name of an Indian village by some hills near Boston. The word means "at the big hill." English settlers used the name for the tribe that lived in the village, and then later for the colony and the state.

massacre A brutal, bloody killing of many people or animals. *Noun.*
—To kill many people or animals in a brutal, bloody way. *Verb.*
mas·sa·cre (mas′ə kər) *noun, plural* **massacres;** *verb,* **massacred, massacring.**

massage The rubbing or kneading of the muscles and joints of the body. A massage relaxes the muscles and helps the circulation of the blood. *Noun.*
—To give a massage to. The trainer *massaged* the athlete's sprained back. *Verb.*
mas·sage (mə säzh′) *noun, plural* **massages;** *verb,* **massaged, massaging.**

massive Of great size; very big; large and solid. The safe in the bank has *massive* steel doors.
mas·sive (mas′iv) *adjective.*

mast A tall pole on a sailing ship or boat that supports the sails and rigging. Masts are usually made of wood or steel.
mast (mast) *noun, plural* **masts.**

master **1.** A person who has power or control over something. The *master* set his slaves free. The dog came when his *master* called him. **2.** A person who has great skill or knowledge about something. The museum has many works by *masters* of painting. **3.** A male teacher. Teachers in private schools are often called *masters.* **4. Master.** A form of address used before the name of a young boy. *Noun.*
—**1.** Very skillful in an art or trade. The work on the new house was done by a *master* carpenter. **2.** Most important; main. The *master* bedroom was larger than the other bedrooms. All the lights in the building were controlled by a *master* switch. *Adjective.*
—**1.** To gain control over. Elaine *mastered* her fears and dove from the high board into the pool. **2.** To become expert in. Keith *mastered* French easily. *Verb.*
mas·ter (mas′tər) *noun, plural* **masters;** *adjective; verb,* **mastered, mastering.**

masterpiece Something that is done with great skill and craftsmanship. Several *masterpieces* were sold at the art auction.
mas·ter·piece (mas′tər pēs′) *noun, plural* **masterpieces.**

mat **1.** A small, flat piece of material used as a floor covering or placed in front of a door. Mats are usually made of rubber or woven straw. **2.** A small, flat piece of material that is put under a dish, vase, or other object. It is used for decoration or to protect a surface. **3.** A large, thick pad or covering that is put on the floor to protect wrestlers or boxers. **4.** A thick, tangled mass. There was a *mat* of hair on the dog's back. *Noun.*
—To become tangled in a thick mass. The wind *matted* her hair. *Verb.*
mat (mat) *noun, plural* **mats;** *verb,* **matted, matting.**

match[1] A short, thin piece of wood or cardboard. It is coated on one end with a chemical substance that makes a flame when it is struck against something.
match (mach) *noun, plural* **matches.**

match[2] **1.** A person or thing that is exactly equal to or very much like another. I bought a pocketbook that was a perfect *match* for my shoes. Bobby is a good tennis player, but he's

at; āpe; cär; end; mē; it; īce; hot; ōld; fôrk; wood; fōōl; oil; out; up; turn; sing; thin; this; hw in white; zh in treasure. ə stands for a in about, e in taken i in pencil, o in lemon, and u in circus.

Multiple-choice Questions, Session 5

25. According to the dictionary, the word ***Massachusetts*** was originally the name of

A. the first English settlement in America.

B. a hill in Boston.

✔ C. **an Indian village near Boston.**

D. the Indian tribe in a village near Boston.

Related Learning Standard for Question 25: **Learning Standard 7 (p. 13)**

26. The word ***massacre*** can be used

A. only as a noun.

B. only as a verb.

✔ C. as a **noun or verb.**

D. as a noun, verb, or adjective.

Related Learning Standard for Question 26: **Learning Standard 5 (p. 13)**

27. Which word has the opposite meaning of ***massive***?

A. colorful

✔ B. **slight**

C. enormous

D. annoying

Related Learning Standard for Question 27: **Learning Standard 4 (p. 13)**

Use the meanings of the prefixes and roots in the box below to answer [the next three] *questions.*

Understanding and Using the Meanings of Prefixes and Roots

centi = 100
milli = 1000
tele = far
bio = life
auto = self
phone = sound
ped = foot
meter = instrument for measuring
scope = instrument for observing
graph = writing or recording

28. An instrument for observing things far away is a

A. telegraph.

B. microscope.

✔ C. telescope.

D. micrometer.

Related Learning Standard for Question 28: **Learning Standard 4 (p. 13)**

29. To send a written message far away, one can use a

A. telephone.

B. telescope.

✔ C. telegraph.

D. microphone.

Related Learning Standard for Question 29: **Learning Standard 4 (p. 13)**

30. A piece of writing about one's own life is

A. a biography.

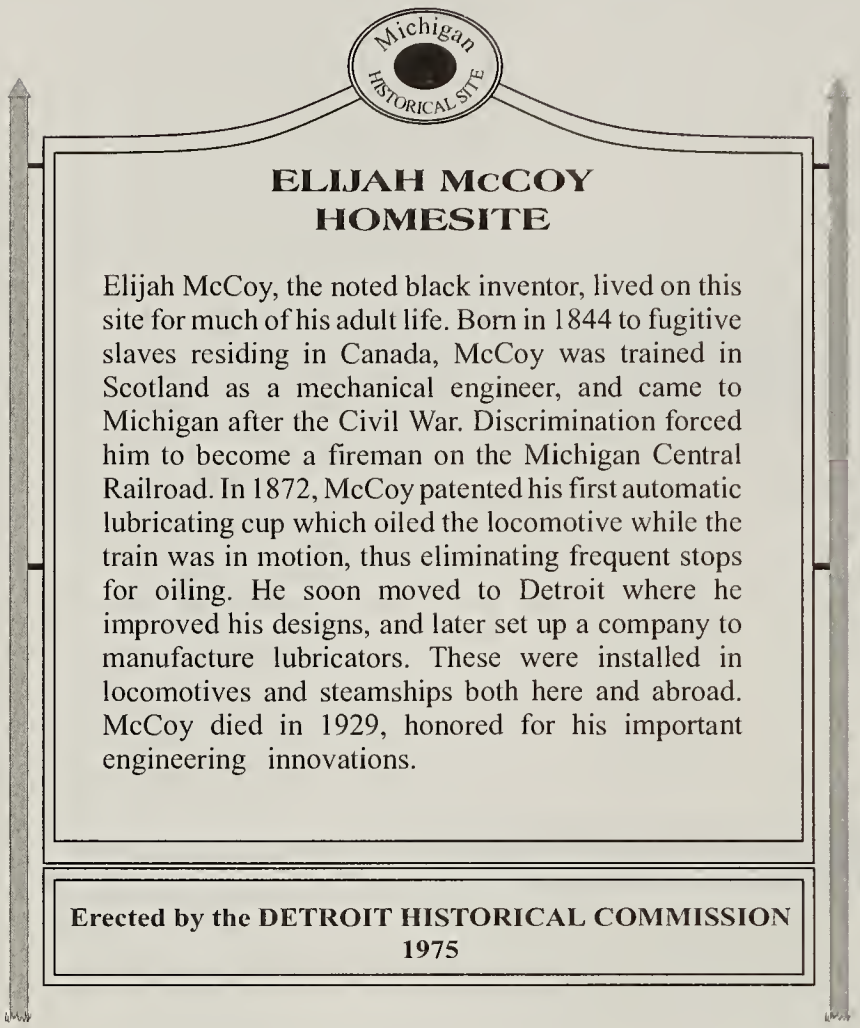
✔ B. an autobiography.

C. a telegraph.

D. an autograph.

Related Learning Standard for Question 30: **Learning Standard 4 (p. 13)**

Reading Selection #2, Session 5


Michigan
HISTORICAL SITE
ELIJAH McCOY
HOMESITE
Elijah McCoy, the noted black inventor, lived on this site for much of his adult life. Born in 1844 to fugitive slaves residing in Canada, McCoy was trained in Scotland as a mechanical engineer, and came to Michigan after the Civil War. Discrimination forced him to become a fireman on the Michigan Central Railroad. In 1872, McCoy patented his first automatic lubricating cup which oiled the locomotive while the train was in motion, thus eliminating frequent stops for oiling. He soon moved to Detroit where he improved his designs, and later set up a company to manufacture lubricators. These were installed in locomotives and steamships both here and abroad. McCoy died in 1929, honored for his important engineering innovations.
Erected by the DETROIT HISTORICAL COMMISSION
1975

Elijah McCoy was a famous American inventor. Read the historical sign that marks the location where he lived most of his life.

The Real McCoy *by Wendy Towle is a biography of Elijah McCoy. Read the comments from two reviews on the jacket of this book. Then use the information from the sign and the book jacket to answer the questions that follow.*

About This Blue Ribbon Book

Where did the expression "the real McCoy" come from? African-American inventor Elijah McCoy's successful design of an automatic oil cup may have inspired the popular phrase. This book introduces children to the life of the brilliant pioneer whose contributions to technology, science, and home are very much in evidence today.

"Clay's acrylic paintings blend authenticity of detail with intensely glowing color and romantic composition . . . This is a striking introduction to one of the first and most successful African-American inventors."
—Booklist, starred review

"Clay's handsome impressionistic paintings glow with pride and achievement."
—Kirkus Reviews

Multiple-choice Questions, Session 5

31. Why was McCoy's automatic oil cup so useful?

A. It used less oil.

✔ **B. It saved time.**

C. It was easy to repair.

D. It could be used in automobiles.

Related Learning Standard for Question 31: **Learning Standard 13 (p. 14)**

32. The book *The Real McCoy* is a biography because

A. it tells about the expression "the real McCoy."

B. McCoy tells about his own life.

C. it tells a story about the past.

✔ **D. someone else tells about McCoy's life.**

Related Learning Standard for Question 32: **Learning Standard 10 (p. 14)**

33. On the sign, the word ***abroad*** in the phrase "both here and abroad" means

✔ **A. in other countries.**

B. in the United States.

C. at sea.

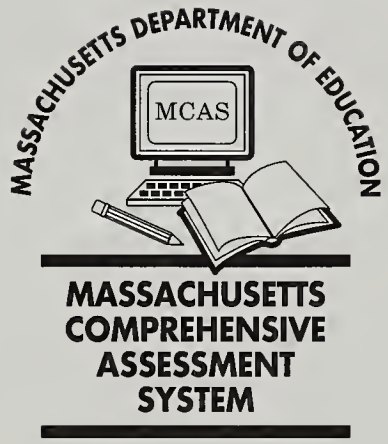
D. all across the country.

Related Learning Standard for Question 33: **Learning Standard 8 (p. 14)**

Open-response Question, Session 5

34. List four questions you might be able to find answers to by reading the whole book *The Real McCoy*.

Related Learning Standard for Question 34: **Learning Standard 13 (p. 14)**



III. English Language Arts, Grade 8

Massachusetts Department of Education

Curriculum Framework *Learning Standards/ MCAS Reporting Categories*

English Language Arts, Grade 8

The learning standards in this section are quoted directly from the Massachusetts *English Language Arts Curriculum Framework*.[1] The English Language Arts section of MCAS was based on three content strands defined in the *Framework:*[2]

- *Language*
- *Literature*
- *Composition*

These three content strands also serve as MCAS reporting categories. *Framework* learning standards are grouped below under their related MCAS reporting category. Applicable *Framework* page numbers are given in parentheses following each heading.

Each Common Item in the second section of this chapter is followed by a reference to the **learning standard** to which it is related.

Language (*Framework*, pp. 28–31)

Learning Standard 4

Students will acquire and use correctly an advanced reading vocabulary of English words, identifying meanings through an understanding of word relationships.

Learning Standard 5

Students will identify, describe, and apply knowledge of the structure of the English language and standard English conventions for sentence structure, usage, punctuation, capitalization, and spelling.

Learning Standard 6

Students will describe and analyze how oral dialects differ from each other in English, how they differ from written standard English, and what role standard American English plays in informal and formal communication.

Learning Standard 7

Students will describe and analyze how the English language has developed and been influenced by other languages.

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[1] Massachusetts Department of Education, *English Language Arts Curriculum Framework* (Malden, 1997).

[2] Some *Framework* learning standards, including all learning standards in the *Media* content strand, cannot be assessed using the MCAS large-scale paper-and-pencil format and are therefore neither tested by MCAS nor included in this document.

Literature (*Framework*, pp. 38–50)

Learning Standard 8

Students will decode accurately and understand new words encountered in their reading materials, drawing on a variety of strategies as needed, and then use these words accurately in . . . writing.

Learning Standard 9

Students will identify the basic facts and essential ideas in what they have read, heard, or viewed.

Learning Standard 10

Students will identify, analyze, and apply knowledge of the characteristics of different genres.

Learning Standard 11

Students will identify, analyze, and apply knowledge of theme in literature and provide evidence from the text to support their understanding.

Learning Standard 12

Students will identify, analyze, and apply knowledge of the structure and elements of fiction and provide evidence from the text to support their understanding.

Learning Standard 13

Students will identify, analyze, and apply knowledge of the structure, elements, and meaning of nonfiction or informational material and provide evidence from the text to support their understanding.

Learning Standard 14

Students will identify, analyze, and apply knowledge of the structure, elements, and theme of poetry and provide evidence from the text to support their understanding.

Learning Standard 15

Students will identify and analyze how an author's choice of words appeals to the senses, creates imagery, suggests mood, and sets tone.

Learning Standard 16

Students will compare and contrast similar myths and narratives from different cultures and geographic regions.

Learning Standard 17

Students will interpret the meaning of literary works, nonfiction, films, and media by using different critical lenses and analytic techniques.

Composition (*Framework,* pp. 56–60)

Learning Standard 19

Students will write compositions with a clear focus, logically related ideas to develop it, and adequate detail.

Learning Standard 20

Students will select and use appropriate genres, modes of reasoning, and speaking styles when writing for different audiences and rhetorical purposes.

Learning Standard 21

Students will demonstrate improvement in organization, content, paragraph development, level of detail, style, tone, and word choice (diction) in their compositions after revising them.

Learning Standard 22

Students will use knowledge of standard English conventions to edit their writing.

MCAS May 1998 Common Test Items

English Language Arts, Grade 8

Number of Sessions

MCAS Student Test Booklets included 7 separate English Language Arts test sessions. Sessions 1, 4, and 5 included selected readings, followed by multiple-choice and open-response questions. All items in these sessions were common items. During Sessions 3A and 3B, which took place on the same day with a short break in between, students wrote a composition (the "Long Composition") in response to a common writing prompt given in Session 3A. Sessions 2 and 6 were not common to all Student Test Booklets, and their content is therefore not included in this document.

Formatting in This Document

Materials in this document are shown in the same order in which they were presented in Student Test Booklets, with the exception that open-response questions are shown following the reading to which they are related. The session in which each reading or group of questions appeared is identified preceding the reading or question group.

Materials are not formatted exactly as they appeared in Student Test Booklets. For instance, in order to present items most efficiently in this document, the following modifications have been made:

- Some fonts and/or font sizes have been changed and/or reduced.
- Some graphics which appeared above questions in Student Test Booklets are shown instead to the side.
- Most graphics have been reduced in actual size from but maintain the same proportions as those that appear in Student Test Booklets.

Correct Answers

Correct answers for **multiple-choice questions** are shown in **bold** and indicated by a check mark.

An overview of procedures for scoring responses to MCAS open-response questions and **writing prompts** can be found in the MCAS fact sheet, "Facts on Scoring of Student Answers to Open-Response Questions and Writing Prompts," which is available on the Department's Internet site at **www.doe.mass.edu.** Scoring procedures are also explained further in the MCAS document, *Guide to Interpreting the 1998 MCAS School and District Reports,* which is due for release in late fall 1998.

Reference Materials and Tools

During Sessions 3A and 3B **only,** at least one dictionary per classroom was provided for student use. No other reference tools or materials were allowed during Sessions 3A or 3B, or during any other English Language Arts testing session.

Reading Selection #1, Session 1

Read the poem entitled "Caged Bird." Think about what the caged bird and the free bird represent and then answer the questions that follow.

Caged Bird

A free bird leaps on the back of the wind
and floats downstream
till the current ends
and dips his wing
in the orange sun rays
and dares to claim the sky.

But a bird that stalks
down his narrow cage
can seldom see through
his bars of rage
his wings are clipped and
his feet are tied
so he opens his throat to sing.

The caged bird sings
with a fearful trill
of things unknown
but longed for still
and his tune is heard
on the distant hill
for the caged bird
sings of freedom.

The free bird thinks of another breeze
and the trade winds soft through the sighing trees
and the fat worms waiting on a dawn-bright lawn
and he names the sky his own.

But a caged bird stands on the grave of dreams
his shadow shouts on a nightmare scream
his wings are clipped and his feet are tied
so he opens his throat to sing.

The caged bird sings
with a fearful trill
of things unknown
but longed for still
and his tune is heard
on the distant hill
for the caged bird
sings of freedom.

—*Maya Angelou*

Multiple-choice Questions, Session 1

1. In lines 1–2, what does the poet mean by "A free bird leaps on the back of the wind / and floats downstream"?

   A. A free bird flies just above the water's surface.

   B. A free bird waits until the wind dies to begin its flight.

   ✔ **C. A free bird can choose to go where the wind takes it.**

   D. A free bird can go only where the wind takes it.

Related Learning Standard for Question 1: **Learning Standard 15 (p. 46)**

2. What is the poet expressing in line 6, "and dares to claim the sky" and in line 25, "and he names the sky his own"?

   A. the free bird's invitation to the caged bird to join him

   B. the beauty of the free bird in flight

   C. the free bird's song in reply to the caged bird's song

   ✔ **D. the confidence of the free bird**

Related Learning Standard for Question 2: **Learning Standard 14 (p. 46)**

3. What does the caged bird's song represent?

   ✔ **A. his desire to fly away**

   B. his need for excitement

   C. his lonely cry for help

   D. his memories of the natural world

Related Learning Standard for Question 3: **Learning Standard 9 (p. 46)**

4. How does the poet emphasize the comparison between the caged bird and the free bird?

   A. by using a long, column-like format

   B. by alternating rhyming words about each bird

   ✔ **C. by alternating descriptions about each bird**

   D. by using longer lines in the central part of the poem

Related Learning Standard for Question 4: **Learning Standard 14 (p. 46)**

Open-response Question, Session 1

5. What conditions of the human spirit do the "caged bird" and the "free bird" represent? Explain your answer using detailed evidence from the poem.

Related Learning Standard for Question 5: **Learning Standard 14 (p. 46)**

Reading Selection #2, Session 1

As you read this opening scene from Act 2 of I Remember Mama, *think about the relationship that Mama and daughter Katrin enjoy. Answer the questions that follow.*

I REMEMBER MAMA

ACT TWO

SCENE: Opening, exactly as in Act One, Katrin at her desk.

KATRIN

(Reading)

"It wasn't very often that I could get Mama to talk—about herself, or her life in the old country, or what she felt about things. You had to catch her unawares, or when she had nothing to do, which was very, very seldom. I don't think I can ever remember seeing Mama unoccupied."

(Laying down the manuscript and looking out front)

I do remember one occasion, though. It was the day before Dagmar came home from the hospital. And as we left, Mama suggested treating me to an ice-cream soda.

(She rises, gets her hat from beside her—a school girl hat—puts it on and crosses C. while she speaks the next lines)

She had never done such a thing before, and I remember how proud it made me feel—just to sit and talk to her quietly like a grown-up person. It was a kind of special treat-moment in my life that I'll always remember—quite apart from the soda, which was wonderful.

(She has reached C. stage now. mama has come from between the curtains, and starts down the steps)

MAMA

Katrin, you like we go next door, and I treat you to an ice-cream soda?

KATRIN

(Young now, and overcome)

Mama—do you mean it?

MAMA

Sure. We celebrate. We celebrate that Dagmar is well, and coming home again.

(They cross to the L., where the turntable represents a drugstore, with a table and two chairs at which they seat themselves)

What you like to have, Katrin?

KATRIN

I think a chocolate. . . no, a strawberry. . . no, a chocolate soda.

MAMA

(Smiling)

You are sure?

KATRIN

(Gravely)

I think so. But, Mama, can we afford it?

MAMA

I think this once we can afford it.

(The soda clerk appears from L.)

SODA CLERK

What's it going to be, ladies?

MAMA

A chocolate ice-cream soda, please—and a cup of coffee.

(The soda clerk goes)

KATRIN

Mama, he called us "ladies"!

(mama smiles)

Why aren't you having a soda, too?

MAMA

Better I like coffee.

KATRIN

When can I drink coffee?

MAMA

When you are grown up.

KATRIN

When I'm eighteen?

MAMA

Maybe before that.

KATRIN

When I graduate?

MAMA

Maybe. I don't know. Comes the day you are grown up, Papa and I will know.

KATRIN

Is coffee really nicer than a soda?

MAMA

When you are grown up, it is.

KATRIN

Did you used to like sodas better . . . before you were grown up?

MAMA

We didn't have sodas before I was grown up. It was in the old country.

KATRIN

(Incredulous)

You mean they don't have sodas in Norway?

MAMA

Now, maybe. Now I think they have many things from America. But not when I was little girl.

(The soda clerk brings the soda and the coffee)

SODA CLERK

There you are, folks.

(He sets them and departs)

KATRIN

(After a good pull at the soda)

Mama, do you ever want to go back to the old country?

MAMA

I like to go back once to look, maybe. To see the mountains and the fjords. I like to show them once to you all. When Dagmar is big, maybe we all go back once . . . one summer . . . like tourists. But that is how it would be. I would be tourist there now. There is no one I would know any more. And maybe we see the little house where Papa and I live when we first marry. And . . .

(Her eyes grow misty and reminiscent)

something else I would look at.

KATRIN

What is that?

(mama does not answer)

What would you look at, Mama?

MAMA

Katrin, you do not know you have brother? Besides Nels?

KATRIN

No! A brother? In Norway? Mama . . . .

MAMA

He is my first baby. I am eighteen when he is born.

KATRIN

Is he there now?

MAMA

(Simply)

He is dead.

KATRIN

(Disappointed)

Oh. I thought you meant . . . I thought you meant a real brother. A long-lost one, like in stories. When did he die?

MAMA

When he is two years old. It is his grave I would like to see again.

(She is suddenly near tears, biting her lip and stirring her coffee violently, spilling a few drops on her suit. She gets her handkerchief from her pocketbook, dabs at her skirt, then briefly at her nose, then she returns the handkerchief and turns to KATRIN *again)*

(Matter-of-factly)

Is good, your ice-cream soda?

KATRIN

(More interested now in mama than in it)

Yes. Mama . . . have you had a very hard life?

MAMA

(Surprised)

Hard? No. No life is easy all the time. It is not meant to be.

KATRIN

But . . . rich people . . . aren't their lives easy?

MAMA

I don't know, Katrin. I have never known rich people. But I see them sometimes in stores and in the streets, and they do not look as if they were easy.

KATRIN

Wouldn't you like to be rich?

MAMA

I would like to be rich the way I would like to be ten feet high. Would be good for some things—bad for others.

KATRIN

But didn't you come to America to get rich?

MAMA

(Shocked)

No. We come to America because they are all here—all the others. Is good for families to be together.

KATRIN

And did you like it right away?

MAMA

Right away. When we get off the ferry boat and I see San Francisco and all the family, I say: "Is like Norway," only it is better than Norway. And then you are all born here, and I become American citizen. But not to get rich.

KATRIN

I want to be rich. Rich and famous. I'd buy you your warm coat. When are you going to get that coat, Mama?

MAMA

Soon now, maybe—when we pay doctor, and Mr. Hyde pay his rent. I think now I must ask him. I ask him tomorrow, after Dagmar comes home.

KATRIN

When I'm rich and famous, I'll buy you lovely clothes. White satin gowns with long trains to them. And jewelry. I'll buy you a pearl necklace.

MAMA

We talk too much!

(She signs to the soda clerk)

Come, finish your soda. We must go home.

(The soda clerk comes)

How much it is, please?

SODA CLERK

Fifteen cents.

MAMA

Here are two dimes. You keep the nickel. And thank you. Was good coffee.

(They start out and up the steps towards the curtains C.)

Multiple-choice Questions, Session 1

6. Act 2 of the play begins with Katrin in the middle of

   A. talking to the audience.

   ✔ **B. reading her manuscript.**

   C. getting dressed to go out.

   D. talking with her mother.

Related Learning Standard for Question 6: **Learning Standard 9 (p. 46)**

7. Mama says, "Katrin, you like we go next door, and I treat you to an ice-cream soda?" The language Mama uses can best be described as

   ✔ **A. dialect.**

   B. jargon.

   C. standard.

   D. formal.

Related Learning Standard for Question 7: **Learning Standard 6 (p. 45)**

8. The phrase *"(The* SODA CLERK *appears from L.)"* shows the

   A. meaning of the words.

   B. statement whispered by Mama.

   C. words spoken by the narrator.

   ✔ **D. stage directions.**

Related Learning Standard for Question 8: **Learning Standard 10 (p. 46)**

9. In this scene, what is something Katrin says is important in life?

   A. having a loving family

   B. living in a nice community

   C. becoming famous

   ✔ **D. having lots of money**

Related Learning Standard for Question 9: **Learning Standard 9 (p. 46)**

10. Katrin's talk about her future plans shows that

    A. the one person she wants to be like is her mother.

    B. she does not want to be like her mother at all.

    ✔ **C. she has big dreams about what she wants to do.**

    D. she has not given the future much thought.

Related Learning Standard for Question 10: **Learning Standard 12 (p. 46)**

11. Mama says, "I would like to be rich the way I would like to be ten feet high" in order to explain to Katrin that

    ✔ **A. being rich would not be all good.**

    B. very few people are rich.

    C. people can buy happiness.

    D. money makes people afraid of you.

Related Learning Standard for Question 11: **Learning Standard 15 (p. 46)**

12. That Mama was born and grew up in Norway is revealed by her

    ✔ **A. speech.**

    B. manner.

    C. special clothing.

    D. preference for coffee.

Related Learning Standard for Question 12: **Learning Standard 15 (p. 46)**

Open-response Question, Session 1

13. Based on the scene, describe the relationship Katrin has with her mother. Use examples from the play to support your answer.

Related Learning Standard for Question 13: **Learning Standard 12 (p. 46)**

Writing Prompt, Sessions 3A and 3B, Long Composition

14. BACKGROUND FOR WRITING

Many parents, teachers, and members of your community are in favor of censoring certain television programs for all children under the age of 16. Many of these people think that all young people should be forbidden to watch programs that contain violence, bad language, and/or sex. There are some people, however, who feel that young people should be given the freedom to decide what programs they would like to watch.

You have been asked to investigate this issue and make a recommendation to the community leaders. Your recommendation will influence whether certain television programs will be censored for the children in your community.

WRITING ASSIGNMENT

Write a persuasive essay stating whether certain television programs that are considered to be unsuitable should be censored for children under 16 in your community. Give at least two reasons to support your position.

Remember, you must argue in such a convincing manner that others will agree with you. The outcome of whether children in your community are forbidden to view "unsuitable" television programs could be decided by the way in which you write your arguments.

Related Learning Standards for Question 14: **Learning Standards 19, 20, 21, and 22 (p. 47)**

Reading Selection #1, Session 4

Read "The Lion's Share" and then answer the questions that follow.

The Lion's Share

THE Lion went once a-hunting along with the Fox, the Jackal, and the Wolf. They hunted and they hunted till at last they surprised a Stag, and soon took its life. Then
4 came the question how the spoil should be divided. "Quarter me this Stag," roared the Lion; so the other animals skinned it and cut it into four parts. Then the Lion took his stand in front of the carcass and pronounced judgment: "The first quarter is for me in my capacity as
9 King of Beasts; the second is mine as arbiter; another share comes to me for my part in the chase; and as for the fourth quarter, well, as for that, I should like to see which of you will dare to lay a paw upon it."
13 "Humph," grumbled the Fox as he walked away with his tail between his legs; but he spoke in a low growl—

"You may share the labours of the great,
but you will not share the spoil."

Multiple-choice Questions, Session 4

15. In line 4, the question comes up as to "how the spoil should be divided." What does *spoil* mean in this sentence?

✔ A. prize or loot

B. rot or decay

C. labor or effort

D. hunt or chase

Related Learning Standard for Question 15: **Learning Standard 8 (p. 46)**

16. The lion says he is an arbiter. What does *arbiter* mean?

✔ A. judge

B. feline

C. butcher

D. worker

Related Learning Standard for Question 16: **Learning Standard 4 (p. 45)**

17. At the end of this story, what does "The Lion's Share" turn out to be?

A. one-fourth of the meat

B. most of the meat

✔ C. all of the meat

D. none of the meat

Related Learning Standard for Question 17: **Learning Standard 9 (p. 46)**

18. Why didn't the Fox argue with the Lion?

A. The Fox was angry with the Lion.

B. The Fox was convinced that the Lion was right.

C. The Fox was no longer hungry.

✔ **D. The Fox was afraid of the Lion.**

Related Learning Standard for Question 18: **Learning Standard 12 (p. 46)**

19. Why is this story classified as a fable?

A. It is very short.

B. It tells a story about one animal outsmarting other animals.

✔ **C. It teaches a lesson and ends with a moral.**

D. It has a surprising ending.

Related Learning Standard for Question 19: **Learning Standard 10 (p. 46)**

Open-response Question, Session 4

20. What is the lesson the Fox, the Jackal, and the Wolf learn in this story? Explain how this lesson applies to people.

Related Learning Standard for Question 20: **Learning Standard 12 (p. 46)**

Reading Selection #2, Session 4

Read the introduction below and Sojourner Truth's speech on behalf of women's rights on the next page. Answer the questions that follow.

INTRODUCTION TO SOJOURNER TRUTH'S SPEECH

1 Born a slave named Isabella, this American abolitionist received her freedom when New York State emancipated slaves in 1827. She moved to New York City, heard what she believed to be heavenly voices, and took the name Sojourner Truth in 1843, when she quit being a maid-servant to become an evangelist. Her opening line was a stunner: "Children, I talk to God and God talks to me!"

2 Sojourner Truth traveled throughout the North (a "sojourner" stays only temporarily in one place) to spread a message that combined religious and abolitionist ideas. After a despondent speech by Frederick Douglass in 1850, she asked her frequent platform mate a question that still reverberates in theological circles: "Frederick, is God dead?" Although illiterate, this mother of five powerfully conveyed her equal-rights message in dialect, with plain words and commonsense reasoning, drawing on her own experiences to persuade listeners of her sincerity. During the Civil War, President Lincoln appointed her counselor to the freedmen of the capital.

3 Blacks and women were in competition for suffrage, and few black women attended early women's rights meetings. Sojourner Truth was an exception; at the 1851 Ohio Women's Rights Convention, in Akron, she spoke of feminism with the same fervor that marked her preaching on abolitionism and religion. Through a conversational form of direct address ("Well, children") and the use of repetition (the question "And ain't I a woman?" is raised four times), Sojourner Truth moved listeners in the early days of the fight for women's rights. She said she wanted her language reported in standard English, "not as if I was saying tickety-ump-ump-nicky-nacky," and in some quotation books her "ain'ts" are changed to "aren'ts," but I think such editorial prettification loses the flavor and force of the eloquence.

SOJOURNER TRUTH'S SPEECH FROM THE 1850s

Well, children, where there is so much racket there must be
4 something out of kilter. I think that 'twixt the Negroes of the South and the women at the North, all talking about rights, the white men will be in a fix pretty soon. But what's all this here talking about?

That man over there says that women need to be helped into carriages, and lifted over ditches, and to have the best place everywhere. Nobody ever helps me into carriages, or over mud puddles, or gives me any best place! And ain't I a woman? Look at me! Look at my arm. I have plowed and planted, and
5 gathered into barns, and no man could head me! And ain't I a woman? I could work as much and eat as much as a man—when I could get it—and bear the lash as well! And ain't I a woman? I have borne thirteen children, and seen them most all sold off to slavery, and when I cried out with my mother's grief, none but Jesus heard me! And ain't I a woman?

Then they talk about this thing in the head; what's this they call it? [Intellect, someone whispers.] That's it, honey. What's that got to do with
6 women's rights or Negro's rights? If my cup won't hold but a pint, and yours holds a quart, wouldn't you be mean not to let me have my little half-measure full?

Then that little man in black there, he says women can't have as much
7 rights as men, 'cause Christ wasn't a woman! Where did your Christ come from? Where did your Christ come from? From God and a woman! Man had nothing to do with him.

If the first woman God ever made was strong enough to turn the world
8 upside down all alone, these women together ought to be able to turn it back, and get it right side up again! And now they is asking to do it, the men better let them.

Obliged to you for hearing me, and now old Sojourner ain't got nothing
9 more to say. ■

Multiple-choice Questions, Session 4

21. Why did Sojourner Truth request that her speeches be reported in standard English?

A. She was trying to sound the same as Frederick Douglass.

✔ **B. She wanted to be taken seriously by the newspaper-reading public.**

C. She felt her message was not really important enough to be passed on word-for-word.

D. She was concerned that people would not remember what she said.

Related Learning Standard for Question 21: **Learning Standard 6 (p. 45)**

22. In paragraph 6, the brackets around the phrase "[Intellect, someone whispers]" indicate that these words were

✔ **A. spoken by someone else.**

B. spoken in a different tone.

C. addressed to a different person.

D. added by the speech writer.

Related Learning Standard for Question 22: **Learning Standard 5 (p. 45)**

23. What is Sojourner Truth's argument?

A. The awarding of rights should not be based upon property ownership.

✔ **B. The awarding of rights should not be based upon gender.**

C. The fight for rights is based on intelligence.

D. Equality must be achieved patiently in a gradual fashion.

Related Learning Standard for Question 23: **Learning Standard 13 (p. 46)**

24. What is the purpose of Sojourner Truth's speech?

A. to analyze

B. to explain

✔ **C. to persuade**

D. to entertain

Related Learning Standard for Question 24: **Learning Standard 10 (p. 46)**

Open-response Question, Session 4

25. What is the **main** point of Sojourner Truth's speech? Explain your answer using information from the speech.

Related Learning Standard for Question 25: **Learning Standard 15 (p. 46)**

Reading Selection #1, Session 5

People have always suffered from disease and have tried to prevent this suffering. Read this article from Isaac Asimov's book How Did We Find Out About Germs? *to find out how one disease was stopped. Answer the questions that follow.*

VACCINATION

1 One hopeful thing about disease was that some diseases only hit a person once. If someone got measles or mumps or chickenpox and got well, then one would never get that particular disease again. He or she was "immune." His or her body had fought off the disease and had developed some kind of defense that would continue to work for many years.

One particularly dreadful disease that only struck once was smallpox. The trouble was that very often once was quite enough. Many people who got smallpox died. Many others recovered, but their faces and bodies were covered with scars left over from the terrible blisters they had had. Every once in a while, though,

2 someone had only a light case that did not scar him or her much. When that happened, the person was just as immune afterward as if he or she had had a terrible case.

Naturally, it was much better to have a light case of smallpox than to have

3 none at all. With a light case, you were safe for life; with none at all, you could never be sure you might not get it at any moment.

People knew that if you were near a person with smallpox you might catch it. Would it not be a good idea, then, to hang around a person with a light case? You

4 might catch the light case and then be safe. To make sure, you might scratch your skin with a needle that had been dipped into some of the fluid in the smallpox blisters of the sick man. This was called "inoculation" (in-OK-yoo-LAY-shun).

5 The trouble was, though, that a person might have a light case of smallpox, yet another person catching it might get a severe case. Inoculation just was not safe.

In the 1770s, an English doctor, Edward Jenner, grew interested in a disease called cowpox. It was called that because it was found in cows and in other farm
6 animals. The disease was something like a very mild smallpox. If a person caught cowpox from a cow, he or she would get a blister or two and that was it. People would hardly even know they were sick.

The country people where Jenner lived thought it was good luck to get
7 cowpox because then you never got smallpox. Most doctors thought this was just a superstition, but Jenner wondered. He did notice that people who worked with farm animals a good deal hardly ever got smallpox.

After twenty years of study, Jenner decided to try a very dangerous experiment. On May 14, 1796, he found a milkmaid who had just developed
8 cowpox. He dipped a needle into the fluid inside a blister on her hand and scratched the skin of a boy who had never had either cowpox or smallpox. The boy got cowpox and developed a blister in the place where he had been scratched.

Jenner then waited for two months to make sure the boy was completely recovered. He was now immune to cowpox, but was he also immune to
9 smallpox? Taking an enormous chance, Jenner deliberately scratched the boy with a needle that had been dipped in the fluid of a real smallpox blister. The boy did not catch smallpox.

Jenner tried the whole thing again two years later when he found another girl
10 with cowpox. He again found he could make someone immune to smallpox by giving them fluid from a cowpox blister.

The medical name for cowpox is "vaccinia" (vak-SIN-ee-uh) from a Latin word for "cow." Jenner's system for giving people cowpox to save them from
11 smallpox was therefore called "vaccination" (VAK-sih-NAY-shun). When Jenner announced his finding, vaccination was quickly adopted all over the world. Smallpox disappeared from places where vaccination was used.

Multiple-choice Questions, Session 5

26. In paragraph 2, when the author says, "once was quite enough," he means that smallpox was a disease that

    A. a person could only get once.

    ✔ **B. was very serious and often fatal.**

    C. was not at all contagious.

    D. differed in its effects on one person.

Related Learning Standard for Question 26: **Learning Standard 15 (p. 46)**

27. Why was inoculation not popular?

    A. Few people were willing to touch a sick person's blisters.

    B. Few people came into contact with people who had the disease.

    ✔ **C. The results could not be predicted.**

    D. The results were almost always fatal.

Related Learning Standard for Question 27: **Learning Standard 9 (p. 46)**

28. How can the reader tell that this article was written for a general audience with little education in medical matters?

    A. by the conversational form of direct address

    B. by the reference to technical terms

    ✔ **C. by the simple language and basic explanations**

    D. by the use of historic facts

Related Learning Standard for Question 28: **Learning Standard 15 (p. 46)**

Reading Selection #2, Session 5

The editorials you are going to read give two different points of view about growing up in an orphanage. Think about how each writer tries to convince the reader of his or her point of view and then answer the questions that follow.

EDITORIAL 1

Communities, Not Orphanages

by Stephen Brown

1 Forgetting painful memories is never easy. For years, I've tried to forget about the worst period of my life: the 18 months I spent in an orphanage. Hearing politicians talk about the need for orphanages, however, brings it all back in horrible detail.

2 I don't know who was crying harder, my mother or me, as the uniformed guard led me away from the reception area to my "room." There were thirty-six beds in that barracks of a bedroom. Five years old and scared to death, I cried myself to sleep that first night and every night. I wasn't the only one either. Later, I learned to act tough, as we marched from bedroom to washroom, from breakfast to classroom. Inside, though, I was dying.

3 Yes, the orphanage was warm, and we had enough to eat. For a kid, though, that isn't enough. What good is a warm place and food, if you live in terror of the abuse handed out by adults and older kids? What good is a warm place and food, if your few pathetic toys and possessions are routinely stolen? What good is a warm place and food, if birthdays and holidays are as empty and hopeless as every other day?

4 Like everyone there, I yearned for the day my mother would come and rescue me. Fortunately, I was one of the lucky ones. Eventually my mother did come and I went home to a fourth-floor slum walk-up. The apartment was cold, small, and dark, but I was in heaven! Although my poor mother wasn't very good at coping, at least I knew she loved me and wanted me with her. Moreover, I was living in a community, not an institution. My neighborhood may have been poverty-stricken, but there were playgrounds, after-school programs, churches, and a day camp. There I found community leaders and neighbors who cared about me. Somehow, incredibly, with their help, I grew up well.

5 In closing, therefore, I urge our policy makers to put their efforts and money into building communities. Communities are what make the ultimate difference in the lives of the young. Orphanages, believe me, will never be a substitute for them!

EDITORIAL 2

A Family Orphanage

by Paula DePaula

July 17, 1962. It must have been a terrible day for my mother. Handing your youngest child over to the custody of a state orphanage is a mother's worst nightmare. But what else could she do? A disabled widow with three little children and no job doesn't have many options.

6

A terrible day for her, maybe, but a new beginning for me. No longer would I huddle in a one-room apartment with a mother afraid to walk in her crime-infested neighborhood. No longer would I be farmed out to relatives who disliked or resented me. No longer would I go without decent food, decent clothing, and a place to sleep.

7

When I entered the orphanage, the deck was shuffled, and I was dealt a much better hand. Trained counselors and teachers took a solid interest in me. Loving caregivers provided food, clothing, and a constant stream of love. There were movies, outings to the zoo, and even canoe trips—things I had never done. Best of all, I had 40 sisters, for the youngsters raised together in orphanages are as close as any biological siblings.

8

We've kept in touch too, like sisters do, and recently, we even had a reunion—all 40 of us. What a wonderful day it was, and, what's more, a rousing endorsement for orphanages! All of us had finished high school, and one-third graduated from college. There is a doctor, two lawyers, and a writer among us, as well as a carpenter, and service workers of all kinds. Family values are all-important to us, too: nine out of ten of us are married, raising families in our own homes. In short, thanks to Pine Hills Orphanage, we're all making positive contributions to society.

9

So, as lawmakers across the land consider orphanages and family values, I say this: The traditional nuclear family is a fine ideal, but supportive families come in all shapes and sizes these days. Think of orphanages, therefore, as just one more viable family model. True, orphanages are larger than most families, but at the same time, they're better equipped and staffed to support our youngest and most vulnerable citizens.

10

Multiple-choice Questions, Session 5

29. In Editorial 1, paragraph 3, Brown asks a number of questions to show

✔ **A. how difficult it was to live in an orphanage.**

B. the point of view of the people who ran the orphanage.

C. the things that the author could not answer.

D. how important it was to have a warm place and food.

Related Learning Standard for Question 29: **Learning Standard 13 (p. 46)**

30. In Editorial 2, paragraph 10, DePaula says that orphanages are "better equipped and staffed to support our youngest and most vulnerable citizens." What does *vulnerable* mean?

A. experienced

✔ **B. defenseless**

C. immature

D. inferior

Related Learning Standard for Question 30: **Learning Standard 4 (p. 45)**

31. Both of these passages can best be described as editorials because they

A. describe an issue of public interest.

✔ **B. give the author's opinion on a subject.**

C. express a common point of view.

D. share details from the author's life.

Related Learning Standard for Question 31: **Learning Standard 10 (p. 46)**

32. The authors of these editorials present views that are

✔ **A. opposed.**

B. uninformed.

C. in agreement.

D. poorly supported.

Related Learning Standard for Question 32: **Learning Standard 9 (p. 46)**

33. How were DePaula's and Brown's experiences similar?

A. Both were terrified when they first arrived at the orphanages.

✔ **B. Both had mothers who loved them and did not want to give them up.**

C. Both liked the orphanages better than the homes they came from.

D. Both had mothers who eventually returned them to their homes.

Related Learning Standard for Question 33: **Learning Standard 13 (p. 46)**

Open-response Question, Session 5

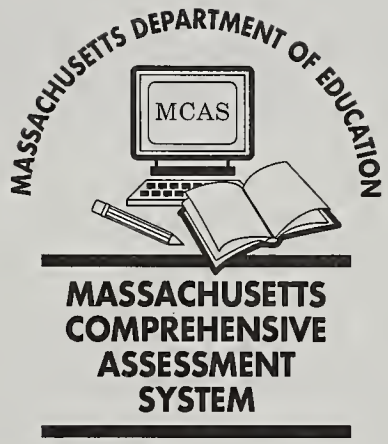
34. Compare the experiences in orphanages of these two writers.

    • How were they similar?

    • How were they different?

    Support your answer with evidence from the editorials.

Related Learning Standard for Question 34: **Learning Standard 9 (p. 46)**



IV. English Language Arts, Grade 10

Massachusetts Department of Education

Curriculum Framework *Learning Standards/ MCAS Reporting Categories*

English Language Arts, Grade 10

The learning standards in this section are quoted directly from the Massachusetts *English Language Arts Curriculum Framework*.[1] The English Language Arts section of MCAS was based on three content strands defined in the *Framework*:[2]

- *Language*
- *Literature*
- *Composition*

These three content strands also serve as MCAS reporting categories. *Framework* learning standards are grouped below under their related MCAS reporting category. Applicable *Framework* page numbers are given in parentheses following each heading.

Each Common Item in the second section of this chapter is followed by a reference to the learning standard to which it is related.

Language (*Framework*, pp. 28–31)

Learning Standard 4

Students will acquire and use correctly an advanced reading vocabulary of English words, identifying meanings through an understanding of word relationships.

Learning Standard 5

Students will identify, describe, and apply knowledge of the structure of the English language and standard English conventions for sentence structure, usage, punctuation, capitalization, and spelling.

Learning Standard 6

Students will describe and analyze how oral dialects differ from each other in English, how they differ from written standard English, and what role standard American English plays in informal and formal communication.

Learning Standard 7

Students will describe and analyze how the English language has developed and been influenced by other languages.

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[1] Massachusetts Department of Education, *English Language Arts Curriculum Framework* (Malden, 1997).

[2] Some *Framework* learning standards, including all learning standards in the *Media* content strand, cannot be assessed using the MCAS large-scale paper-and-pencil format and are therefore neither tested by MCAS nor included in this document.

Literature (*Framework*, pp. 38–50)

Learning Standard 8

Students will decode accurately and understand new words encountered in their reading materials, drawing on a variety of strategies as needed, and then use these words accurately in . . . writing.

Learning Standard 9

Students will identify the basic facts and essential ideas in what they have read, heard, or viewed.

Learning Standard 10

Students will identify, analyze, and apply knowledge of the characteristics of different genres.

Learning Standard 11

Students will identify, analyze, and apply knowledge of theme in literature and provide evidence from the text to support their understanding.

Learning Standard 12

Students will identify, analyze, and apply knowledge of the structure and elements of fiction and provide evidence from the text to support their understanding.

Learning Standard 13

Students will identify, analyze, and apply knowledge of the structure, elements, and meaning of nonfiction or informational material and provide evidence from the text to support their understanding.

Learning Standard 14

Students will identify, analyze, and apply knowledge of the structure, elements, and theme of poetry and provide evidence from the text to support their understanding.

Learning Standard 15

Students will identify and analyze how an author's choice of words appeals to the senses, creates imagery, suggests mood, and sets tone.

Learning Standard 16

Students will compare and contrast similar myths and narratives from different cultures and geographic regions.

Learning Standard 17

Students will interpret the meaning of literary works, nonfiction, films, and media by using different critical lenses and analytic techniques.

Composition (*Framework,* pp. 56–60)

Learning Standard 19

Students will write compositions with a clear focus, logically related ideas to develop it, and adequate detail.

Learning Standard 20

Students will select and use appropriate genres, modes of reasoning, and speaking styles when writing for different audiences and rhetorical purposes.

Learning Standard 21

Students will demonstrate improvement in organization, content, paragraph development, level of detail, style, tone, and word choice (diction) in their compositions after revising them.

Learning Standard 22

Students will use knowledge of standard English conventions to edit their writing.

MCAS May 1998 Common Test Items

English Language Arts, Grade 10

Number of Sessions

MCAS Student Test Booklets included 7 separate English Language Arts test sessions. Sessions 1, 4, and 5 included selected readings, followed by multiple-choice and open-response questions. All items in these sessions were common items. During Sessions 3A and 3B, which took place on the same day with a short break in between, students wrote a composition (the "Long Composition") in response to a common writing prompt given in Session 3A. Sessions 2 and 6 were not common to all Student Test Booklets, and their content is therefore not included in this document.

Formatting in This Document

Materials in this document are shown in the same order in which they were presented in Student Test Booklets, with the exception that open-response questions are shown following the reading to which they are related. The session in which each reading or group of questions appeared is identified preceding the reading or question group.

Materials are not formatted exactly as they appeared in Student Test Booklets. For instance, in order to present items most efficiently in this document, the following modifications have been made:

- Some fonts and/or font sizes have been changed and/or reduced.
- Some graphics which appeared above questions in Student Test Booklets are shown instead to the side.
- Most graphics have been reduced in actual size from but maintain the same proportions as those that appear in Student Test Booklets.

Correct Answers

Correct answers for multiple-choice questions are shown in bold and indicated by a check mark.

An overview of procedures for scoring responses to MCAS open-response questions and writing prompts can be found in the MCAS fact sheet, "Facts on Scoring of Student Answers to Open-Response Questions and Writing Prompts," which is available on the Department's Internet site at www.doe.mass.edu. Scoring procedures are also explained further in the MCAS document, *Guide to Interpreting the 1998 MCAS School and District Reports,* which is due for release in late fall 1998.

Reference Materials and Tools

During Sessions 3A and 3B only, at least one dictionary per classroom was provided for student use. No other reference tools or materials were allowed during Sessions 3A or 3B, or during any other English Language Arts testing session.

Reading Selection #1, Session 1

The following selection is an excerpt from the novel Of Time and the River *by American novelist Thomas Wolfe. This scene occurs as the main character of the novel is leaving his home state. Read the excerpt and then answer the questions that follow.*

Of Time and the River

Thomas Wolfe

The train toils slowly round the mountain grades, the short and powerful blasts of its squat funnel sound harsh and metallic against the sides of rocky cuts. One looks out the window and sees cut, bank, and gorge slide slowly past, the old rock wet and gleaming with the water of some buried mountain spring. The train goes slowly over the perilous and dizzy heights of a wooden trestle; far below, the traveller can see and hear the clean foaming clamors of rock-bright mountain water; beside the track, before his
1 little hut, a switchman stands looking at the train with the slow wondering gaze of the mountaineer. The little shack in which he lives is stuck to the very edge of the track above the steep and perilous ravine. His wife, a slattern with a hank of tight drawn hair, a snuff-stick in her mouth, and the same gaunt, slow wondering stare her husband has, stands in the doorway of the shack, holding a dirty little baby in her arms.

It is all so strange, so near, so far, so terrible, beautiful, and instantly familiar, that it seems to the traveller that he must have known these people forever, that he must now stretch forth his hand to them from the windows and the rich and sumptuous luxury of the pullman car, that he must speak to
2 them. And it seems to him that all the strange and bitter miracle of life—how, why, or in what way, he does not know—is in that instant greeting and farewell; for once seen, and lost the moment that he sees it, it is his forever and he can never forget it. And then the slow toiling train has passed these lives and faces and is gone, and there is something in his heart he cannot say.

At length the train has breached the last great wall of the soaring ranges, has made its slow and sinuous descent around the powerful bends and cork-screws of the shining rails (which now he sees above him seven times) and towards dark, the lowland country has been reached. The sun goes down
3 behind the train a tremendous globe of orange and pollen, the soaring ranges melt swiftly into shapes of smoky and enchanted purple, night comes—great-starred and velvet-breasted night—and now the train takes up its level pounding rhythm across the piedmont swell and convolution of the mighty State.

Multiple-choice Questions, Session 1

1. This excerpt can best be described as

   A. persuasive writing.

   ✔ B. descriptive writing.

   C. humorous writing.

   D. technical writing.

Related Learning Standard for Question 1: **Learning Standard 10 (p. 78)**

2. What is the basis for the organization of this excerpt?

   A. the sight of soaring mountain ranges

   B. the power of the huge train as it crosses mountains

   C. sounds that increase in loudness in time

   ✔ D. a fleeting scene that deeply affects the passenger in the train

Related Learning Standard for Question 2: **Learning Standard 12 (p. 78)**

clam•or (klăm´ər) *n.* **1.** A loud outcry; hubbub. **2.** A vehement expression of discontent or protest; public outcry: *a clamor for pollution control.* **3.** A loud and sustained noise; din. —*v.* **-ored, -or•ing, -ors.** —*intr.* **1.** To make a clamor. **2.** To make insistent demands or complaints: *clamored for tax reforms.* —*tr.* **1.** To exclaim insistently and noisily. **2.** To drive or influence by clamor. [ME *clamour* < OFr. < Lat. *clamor*, shout < *clamare*, to cry out.]

3. According to the dictionary entry above, in which language did the word *clamor* originate?

   A. Greek

   ✔ B. Latin

   C. French

   D. German

Related Learning Standard for Question 3: **Learning Standard 7 (p. 77)**

4. The last sentence of paragraph 2 says, "And then the slow toiling train has passed these lives and faces and is gone, and there is something in his heart he cannot say." This means that the observer in the train

✔ **A. is overwhelmed by his reaction to the passing scene.**

B. has already forgotten what he has seen.

C. misses the family he is leaving behind.

D. feels pity for the switchman and his family.

Related Learning Standard for Question 4: **Learning Standard 15 (p. 78)**

5. In paragraph 3, what does the word *sinuous* mean?

A. sinister

B. cautious

✔ **C. winding**

D. long

Related Learning Standard for Question 5: **Learning Standard 4 (p. 77)**

6. The train in this excerpt can be seen as a symbol for

✔ **A. the narrator passing through time.**

B. the hard life of the switchman and his family.

C. the majestic mountain ranges that must be crossed.

D. the constant rising and setting of the sun.

Related Learning Standard for Question 6: **Learning Standard 12 (p. 78)**

Open-response Questions, Session 1

7. What do the switchman and his family represent for the passenger on the train? Support your answer with evidence from the excerpt.

Related Learning Standard for Question 7: **Learning Standard 11 (p. 78)**

8. This excerpt contains many examples of imagery. Choose two examples of imagery and explain what effect each creates.

Related Learning Standard for Question 8: **Learning Standard 15 (p. 78)**

Reading Selection #2, Session 1

In this excerpt from The Hunger of Memory, *Richard Rodriguez provides information about his childhood reading habits. He describes his belief as a youth that the way to become an educated person was to read as many books as possible that other people considered worthwhile. As you read, think about the author's assessment of himself as a young reader. When you have finished reading, answer the questions that follow.*

The Hunger of Memory

by Richard Rodriguez

In fourth grade I embarked upon a grandiose reading program. 'Give me the names of important books,' I would say to startled teachers. They soon found out that I had in mind 'adult books.' I ignored their suggestion of anything I suspected was written for children. (Not until I was in college, as a result, did I read *Huckleberry Finn* or *Alice's Adventures in Wonderland.)* Instead, I read *The Scarlet Letter* and Franklin's *Autobiography.* And whatever I read I read for extra credit. Each time I finished a book, I reported the achievement to a teacher and basked in the praise my effort earned. Despite my best efforts, however, there seemed to be more and more books I needed to read. At the library I would literally tremble as I came upon whole shelves of books I hadn't read. So I read and I read and I read: *Great Expectations;* all the short stories of Kipling; *The Babe Ruth Story;* the entire first volume of the *Encyclopedia Britannica* (A-ANSTEY); the *Iliad; Moby Dick; Gone with the Wind; The Good Earth; Ramona; Forever Amber; The Lives of the Saints; Crime and Punishment; The Pearl.* . . . Librarians who initially frowned when I checked out the maximum ten books at a time started saving books they thought I might like. Teachers would say to the rest of the class, 'I only wish the rest of you took reading as seriously as Richard obviously does.' 1

But at home I would hear my mother wondering, 'What do you see in your books?' (Was reading a hobby like her knitting? Was so much reading even healthy for a boy? Was it the sign of 'brains'? Or was it just a convenient excuse for not helping around the house on Saturday mornings?) Always, 'What do you see. . .?' 2

What *did* I see in my books? I had the idea that they were crucial for my academic success, though I couldn't have said exactly how or why. In the sixth grade I simply concluded that what gave a book its value was some major idea or theme it contained. If that core essence could be mined and memorized, I would become learned like my teachers. I decided to record in a notebook the themes of the books that I read. After reading *Robinson Crusoe,* I wrote that its theme was 'the value of learning to live by oneself.' When I completed *Wuthering Heights,* I noted the danger of 'letting emotions get out of control.' Rereading these brief moralistic appraisals usually left me disheartened. I couldn't believe that they were really the source of reading's value. But for many more years, they constituted the only means I had of describing to myself the educational value of books. 3

In spite of my earnestness, I found reading a pleasurable activity. I came to enjoy the lonely good company of books. Early on weekday mornings, I'd read in my bed. I'd feel a mysterious comfort then, reading in the dawn quiet—the blue-gray silence interrupted by the occasional churning of the refrigerator motor a few rooms away or the more distant sounds of a city bus beginning its run. On weekends I'd go

4 to the public library to read, surrounded by old men and women. Or, if the weather was fine, I would take my books to the park and read in the shade of a tree. A warm summer evening was my favorite reading time. Neighbors would leave for vacation and I would water their lawns. I would sit through the twilight on the front porches or in backyards, reading to the cool, whirling sounds of the sprinklers.

I also had favorite writers. But often those writers I enjoyed most I was least able to value. When I read William Saroyan's *The Human Comedy,* I was immediately pleased by the narrator's warmth and the charm of his story. But as quickly I became suspicious. A book so enjoyable to read couldn't be very 'important.' Another summer I determined to read all the novels of Dickens. Reading his fat novels, I loved the feeling I got—after the first hundred pages—of being at home in a fictional world

5 where I knew the names of the characters and cared about what was going to happen to them. And it bothered me that I was forced away at the conclusion, when the fiction closed tight, like a fortune-teller's fist—the futures of all the major characters neatly resolved. I never knew how to take such feelings seriously, however. Nor did I suspect that these experiences could be part of a novel's meaning. Still, there were pleasures to sustain me after I'd finish my books. Carrying a volume back to the library, I would be pleased by its weight. I'd run my fingers along the edge of the pages and marvel at the breadth of my achievement. Around my room, growing stacks of paperback books reinforced my assurance.

I entered high school having read hundreds of books. My habit of reading made me a confident speaker and writer of English. Reading also enabled me to sense something of the shape, the major concerns, of Western thought. (I was able to say something about Dante and Descartes and Engels and James Baldwin in my high school term papers.) In these various ways, books brought me academic success as I hoped that they would. But I was not a good reader. Merely bookish, I lacked a point of view when I read. Rather, I read in order to acquire a point of view. I vacuumed books for epigrams, scraps of information, ideas, themes—anything to fill the hollow within me and make me feel educated. When 6 one of my teachers suggested to his drowsy tenth-grade English class that a person could not have a 'complicated idea' until he had read at least two thousand books, I heard the remark without detecting either its irony or its very complicated truth. I merely determined to compile a list of all the books I had ever read. Harsh with myself, I included only once a title I might have read several times. (How, after all, could one read a book more than once?) And I included only those books over a hundred pages in length. (Could anything shorter be a book?)

There was yet another high school list I compiled. One day I came across a newspaper article about the retirement of an English professor at a nearby state college. The article was accompanied by a list of the 'hundred most important books of Western Civilization.' 'More than anything else in my life,' the professor told the reporter with finality, 'these books have made me all that I am.' That was the kind of remark I couldn't ignore. I clipped out the list and kept it for the several months it took me to 7 read all of the titles. Most books, of course, I barely understood. While reading Plato's *Republic,* for instance, I needed to keep looking at the book jacket comments to remind myself what the text was about. Nevertheless, with the special patience and superstition of a scholarship boy, I looked at every word of the text. And by the time I reached the last word, relieved, I convinced myself that I had read *The Republic.* In a ceremony of great pride, I solemnly crossed Plato off my list.

Multiple-choice Questions, Session 1

9. Which word is closest to the meaning of *grandiose* in paragraph 1?

   A. limited

   B. easy

   ✔ C. **ambitious**

   D. dangerous

Related Learning Standard for Question 9: **Learning Standard 8 (p. 78)**

10. The author wrote down the themes of books he read as a young student because he

   A. needed them to report to his class about all the books he read.

   ✔ **B. thought remembering themes would make him as learned as his teachers.**

   C. took pleasure in rereading both the books and his notes.

   D. was looking for the one best theme to guide his life.

Related Learning Standard for Question 10: **Learning Standard 9 (p. 78)**

11. In paragraph 6, what does the word *epigrams* mean?

   A. paragraphs

   B. synonyms

   C. incorrect grammar

   ✔ D. **clever statements**

Related Learning Standard for Question 11: **Learning Standard 4 (p. 77)**

12. This excerpt is an example of

A. biography.

✔ **B. autobiography.**

C. satire.

D. persuasion.

Related Learning Standard for Question 12: **Learning Standard 10 (p. 78)**

13. What does the author want the reader to remember most from this excerpt?

✔ **A. the author's attitude as a boy toward reading books**

B. the encouragement the author received from librarians

C. the titles of books that are important to read

D. the importance of an encouraging family

Related Learning Standard for Question 13: **Learning Standard 10 (p. 78)**

14. The author's account of this part of his youth shows

A. anxiety about his reading choices.

✔ **B. reflection on his motives for reading.**

C. frustration with librarians.

D. eagerness to impress the reader.

Related Learning Standard for Question 14: **Learning Standard 9 (p. 78)**

Open-response Question, Session 1

15. How has Richard Rodriguez's attitude about reading changed since his youth? What do you think he would do differently now? Use specific information from the excerpt to support your answer.

Related Learning Standard for Question 15: **Learning Standard 11 (p. 78)**

Writing Prompt, Sessions 3A and 3B, Long Composition

16. BACKGROUND FOR WRITING

Read the following opening paragraph from a short story by Flannery O'Connor. When you have finished reading, respond to the writing assignment below.

> Besides the neutral expression that she wore when she was alone, Mrs. Freeman had two others, forward and reverse, that she used for all her human dealings. Her forward expression was steady and driving like the advance of a heavy truck. Her eyes never swerved to left or right but turned as the story turned as if they followed a yellow line down the center of it. She seldom used the other expression because it was not often necessary for her to retract a statement, but when she did, her face came to a complete stop, there was an almost imperceptible movement of her black eyes, during which they seemed to be receding, and then the observer would see that Mrs. Freeman, though she might stand there as real as several grain sacks thrown on top of each other, was no longer there in spirit. As for getting anything across to her when this was the case, Mrs. Hopewell had given it up. She might talk her head off. Mrs. Freeman could never be brought to admit herself wrong on any point. She would stand there and if she could be brought to say anything, it was something like, "Well, I wouldn't of said it was and I wouldn't of said it wasn't" or letting her gaze range over the top kitchen shelf were there was an assortment of dusty bottles, she might remark, "I see you ain't ate many of them figs you put up last summer."

WRITING ASSIGNMENT

In many literary works, the opening paragraphs provide clues for what is yet to come. Read the above paragraph for such clues. Based on these clues, write an essay that explains what comes next in this story. In developing your essay, you might want to consider the purpose of the first sentence, imagery, word choice, point of view, mood, setting, and characters.

Related Learning Standards for Question 16: **Learning Standards 19, 20, 21, and 22 (p. 79)**

Reading Selection #1, Session 4

The following selection contains instructions for following a hiking trail on Pleasant Mountain. Read the instructions carefully and then answer the questions that follow.

Pleasant Mountain

Distance (round trip): 3 1/2 miles
Hiking Time: 3 hours
Vertical rise: 1,500 feet
Map: USGS 7 1/2' Pleasant Mountain

1 Pleasant Mountain is an impressive, rangy mountain that rises dramatically west of Moose Pond in Bridgton and Denmark.

2 On US 302, drive about 4 miles north and west from the center of Bridgton to the road that serves the ski area on the mountain's northeast slope. Take this road (the first left off US 302 after you pass Moose Pond) and watch for trail signs (an old pine tree with a red M painted on it at a gravel turnout) just over 3 miles south of US 302. Parking is difficult here for more than one or two cars. Make sure your car is fully off the road and not blocking the fire road.

3 The Ledges Trail, sometimes called the Moose Trail (hence the red M mark), begins its ascent from the east side of the mountain along the route of a gravel fire road. Red blazes mark the route for its entire length. You walk first northwest and west up the broad fire road, passing through patches of wild raspberries. Shortly the road narrows to a trail eroded by water. Climbing steadily west and southwest, you reach a fork in the road (which is again wider at this point). Bear left here, and—as you make an easy arc more toward the southwest—cross two small brooks in an area thickly grown up with young birch, beech, and cherry.

4 You then begin the steeper climb up to the ledges as you wind west up the ridge. At just under 1 mile, you climb over rock outcrops of Chatham granite that indicate the beginning of the ledges. Soon you move up out of the trees and merge onto the ledges proper.

5 There are fine views here to the southwest, south, and to the southeast over Moose Pond. Continue by climbing gradually around to the northwest, with the southwest hump of the mountain becoming visible through the young oaks along the trail.

6 You soon pass over a second open ledge area with good views to the west and southwest. Meandering first northeast and then northwest again, you climb more steeply over ground covered with low-bush blueberries, scramble over more ledge, and pass a third open ledge, which looks to the west. Turn northeast again, climb over an outcrop, and then turn north. In a few yards you'll reach the summit and fire tower on a grassy lawn that was once the site of the Pleasant Mountain House.

7 The views to the west and northwest from the "Green Pinnacle" are spectacular on a clear day. The Presidentials in New Hampshire stretch north to south on the distant horizon. Carter Dome is clearly visible over the west tongue of Pleasant. Tiny Kezar Pond and the narrow thread of Kezar Lake lie to the northwest, while Lovell Pond near Fryeburg can be seen to the southwest. The present fire warden welcomes visitors to his perch in the tower, but this, of course, is always subject to change. To descend, retrace your steps for a brisk hike of about 50 minutes.

Multiple-choice Questions, Session 4

17. The main purpose of this article is to

    A. prove that a hike to Pleasant Mountain is a worthwhile trip.

    ✔ **B. provide clear directions that hikers can follow.**

    C. convince hikers to hire professional guides.

    D. describe magnificent views from the top of Pleasant Mountain.

Related Learning Standard for Question 17: **Learning Standard 13 (p. 78)**

18. What is the subject of the verb *take* in the second sentence in paragraph 2: "Take this road (the first left off US 302 after you pass Moose Pond) and watch for trail signs (an old pine tree with a red M painted on it at a gravel turnout) just over 3 miles south of US 302"?

    ✔ **A. you**

    B. road

    C. Moose Pond

    D. trail signs

Related Learning Standard for Question 18: **Learning Standard 5 (p. 77)**

19. You will be in the parking area for Pleasant Mountain when you

    A. have driven four miles north and west from Bridgton.

    B. can see Moose Pond clearly.

    C. take the first left off US 302.

    ✔ **D. are about three miles south of US 302.**

Related Learning Standard for Question 19: **Learning Standard 9 (p. 78)**

20. In paragraph 3, what does the word *ascent* mean?

✔ **A. upward rise**

B. winding trail

C. narrow road

D. gravel path

Related Learning Standard for Question 20: **Learning Standard 8 (p. 78)**

21. If you follow the described trail, at about one mile you will have passed all of the following **except**

A. red blazes marking the trail.

✔ **B. low-bush blueberries.**

C. wild raspberries.

D. young birch trees.

Related Learning Standard for Question 21: **Learning Standard 9 (p. 78)**

22. The organization of information in this article is best described as

✔ **A. sequential.**

B. historical.

C. geographical.

D. hierarchical.

Related Learning Standard for Question 22: **Learning Standard 10 (p. 78)**

Open-response Questions, Session 4

23. Describe the descent from the ledges proper (as mentioned at the end of paragraph 4) to your car by reversing the directions given in this selection. Be sure to include all of the important landmarks, compass directions, and routes in proper order.

Related Learning Standard for Question 23: **Learning Standard 13 (p. 78)**

24. To what extent does the author show an appreciation for nature? Cite at least two examples from the text in your answer.

Related Learning Standard for Question 24: **Learning Standard 15 (p. 78)**

Reading Selection #2, Session 4

This excerpt is from Act II, Scene 2, lines 196-229 from Antony and Cleopatra *by William Shakespeare. Read the excerpt and then answer the questions that follow.*

Antony and Cleopatra

ENOBARBUS When she first met Mark Antony, she pursed up his heart, upon the river of Cydnus.

AGRIPPA There she appeared indeed; or my reporter devised well for her.

ENOBARBUS I will tell you.
The barge she sat in, like a burnish'd throne,
Burn'd on the water: the poop was beaten gold;
Purple the sails, and so perfumed that
The winds were love-sick with them; the oars were silver,
Which to the tune of flutes kept stroke, and made
The water which they beat to follow faster,
As amorous of their strokes. For her own person,
It beggar'd all description: she did lie
In her pavilion—cloth-of-gold of tissue—
O'er-picturing the Venus where we see
The fancy outwork nature: on each side her
Stood pretty dimpled boys, like smiling Cupids,
With divers-colour'd fans, whose wind did seem
To glow the delicate cheeks which they did cool,
And what they undid did.

AGRIPPA O, rare for Antony!

ENOBARBUS Her gentlewomen, like the Nereides,
So many mermaids, tended her i' the eyes,
And made their bends adorning: at the helm
A seeming mermaid steers: the silken tackle
Swell with the touches of those flower-soft hands,
That yarely frame the office. From the barge
A strange invisible perfume hits the sense
Of the adjacent wharfs. The city cast
Her people out upon her; and Antony,
Enthroned i' the market-place, did sit alone,
Whistling to the air; which, but for vacancy,
Had gone to gaze on Cleopatra too,
And made a gap in nature.

AGRIPPA Rare Egyptian!

Multiple-choice Questions, Session 4

25. This excerpt describes the

    A. reunion of Antony and Cleopatra.

    ✔ B. arrival of Cleopatra on a river barge.

    C. voyage shared by Antony and Cleopatra.

    D. time when Cleopatra left Antony.

Related Learning Standard for Question 25: **Learning Standard 11 (p. 78)**

26. What does the statement "For her own person, / It beggar'd all description . . ." (lines 207–208) mean?

    A. Cleopatra was dressed as a poor person.

    B. Cleopatra's personality was too complex to describe.

    C. Cleopatra was surrounded by too many people to count.

    ✔ D. Cleopatra's appearance was too wonderful for words.

Related Learning Standard for Question 26: **Learning Standard 15 (p. 78)**

27. Enobarbus compares Cleopatra lying in her tent to

    A. the Egyptian goddess Nereide.

    B. the planet Venus in the heavens.

    ✔ C. Venus, the goddess of love.

    D. Nereide, the queen of the mermaids.

Related Learning Standard for Question 27: **Learning Standard 9 (p. 78)**

28. Reread the statement "Her . . . adorning:" (lines 216–218). In a contemporary American production of *Antony and Cleopatra,* these lines could be rewritten as:

    Her personal attendants, resembling the sea nymphs Nereides,
    Responded to her every look as if they were so many mermaids,
    And made their graceful bowings beautiful.

    These rewritten lines are an example of

✔ **A. standard English.**

B. non-standard English.

C. slang.

D. dialect.

Related Learning Standard for Question 28: **Learning Standard 6 (p. 77)**

29. According to Enobarbus, when Cleopatra's barge appeared in the harbor,

✔ **A. all the people in the city rushed to see it.**

B. no one noticed its arrival for a long time.

C. Antony hurried from the market to meet it.

D. it was surrounded by warships.

Related Learning Standard for Question 29: **Learning Standard 9 (p. 78)**

30. When Enobarbus says that even the air would have gone to see Cleopatra it is an example of

A. onomatopoeia.

B. simile.

C. irony.

✔ **D. personification.**

Related Learning Standard for Question 30: **Learning Standard 15 (p. 78)**

Open-response Question, Session 4

31. Describe the entrance of Cleopatra's barge in this scene. Include a physical description of the scene and the effect it had on the people of the city. Use specific details from the excerpt to support your answer.

Related Learning Standard for Question 31: **Learning Standard 9 (p. 78)**

Reading Selection #1, Session 5

In 1950, William Faulkner won the Nobel Prize for Literature. This is his acceptance speech. Read the speech carefully, remember the author's passion for his work, and then answer the questions that follow.

Address upon Receiving the Nobel Prize for Literature

William Faulkner

STOCKHOLM, DECEMBER 10, 1950

I feel that this award was not made to me as a man, but to my work—a life's work in the agony and sweat of the human spirit, not for glory and least of all for profit, but to create out of the materials of the human spirit something which did not exist before. So this award is only mine in trust. It will not be difficult to find a dedication for the money part of it

1 commensurate with the purpose and significance of its origin. But I would like to do the same with the acclaim too, by using this moment as a pinnacle from which I might be listened to by the young men and women already dedicated to the same anguish and travail, among whom is already that one who will some day stand here where I am standing.

Our tragedy today is a general and universal physical fear so long sustained by now that we can even bear it. There are no longer problems of the spirit. There is only the question: When

2 will I be blown up? Because of this, the young man or woman writing today has forgotten the problems of the human heart in conflict with itself which alone can make good writing because only that is worth writing about, worth the agony and the sweat.

He must learn them again. He must teach himself that the basest of all things is to be afraid; and, teaching himself that, forget it forever, leaving no room in his workshop for anything but the old verities and truths of the heart, the old universal truths lacking which any

3 story is ephemeral and doomed—love and honor and pity and pride and compassion and sacrifice. Until he does so, he labors under a curse. He writes not of love but of lust, of defeats in which nobody loses anything of value, of victories without hope and, worst of all, without pity or compassion. His griefs grieve on no universal bones, leaving no scars. He writes not of the heart but of the glands.

Until he relearns these things, he will write as though he stood among and watched the end of man. I decline to accept the end of man. It is easy enough to say that man is immortal simply because he will endure: that when the last ding-dong of doom has clanged and faded from the last worthless rock hanging tideless in the last red and dying evening, that even then there will still be one more sound: that of his puny inexhaustible voice, still talking. I refuse to

4 accept this. I believe that man will not merely endure: he will prevail. He is immortal, not because he alone among creatures has an inexhaustible voice, but because he has a soul, a spirit capable of compassion and sacrifice and endurance. The poet's, the writer's, duty is to write about these things. It is his privilege to help man endure by lifting his heart, by reminding him of the courage and honor and hope and pride and compassion and pity and sacrifice which have been the glory of his past. The poet's voice need not merely be the record of man, it can be one of the props, the pillars to help him endure and prevail.

Multiple-choice Questions, Session 5

32. In this speech, William Faulkner states his belief that the only subject worth writing about is

A. potential disaster looming over humanity.

B. the inexhaustible voice and spirit of human beings.

C. the ultimate immortality of man.

✔ **D. problems of the human heart in conflict with itself.**

Related Learning Standard for Question 32: **Learning Standard 9 (p. 78)**

33. According to Faulkner, the primary purpose of art is to

A. entertain.

B. criticize.

✔ **C. inspire.**

D. warn.

Related Learning Standard for Question 33: **Learning Standard 9 (p. 78)**

34. The phrase, "the last ding-dong of doom has clanged," is an example of

A. irony.

✔ **B. alliteration.**

C. hyperbole.

D. simile.

Related Learning Standard for Question 34: **Learning Standard 15 (p. 78)**

35. What is the tone at the end of this speech?

✔ **A. optimistic**

B. euphoric

C. cynical

D. depressed

Related Learning Standard for Question 35: **Learning Standard 9 (p. 78)**

36. Based on the beliefs expressed in this speech, what do you think Faulkner would consider the least admirable human trait for a writer?

✔ **A. fear**

B. compassion

C. pity

D. pride

Related Learning Standard for Question 36: **Learning Standard 13 (p. 78)**

Open-response Question, Session 5

37. What does William Faulkner believe a writer's duty to be? Use specific information from the speech to explain Faulkner's ideas about a writer's duty. Give examples of how a writer can fulfill that duty.

Related Learning Standard for Question 37: **Learning Standard 13 (p. 78)**

Reading Selection #2, Session 5

The following excerpt is from the introduction to Mythology and You. *Read the excerpt carefully, remember the purpose of introductions, and then answer the questions that follow.*

The Value of Myths

Originally the Greek myths were stories passed orally from one generation to the next. What is the power of these stories that they remain vital after three thousand
1 years? Why do children clamor to hear them? Why do poets, writers, and even advertisers allude to them? Why do anthropologists, sociologists, clergymen, psychiatrists, historians, and teachers of literature, study them?

The answer to these questions can be found in an analysis of the nature of myth. However, for scholars of various disciplines to agree upon a definition of myth would be as difficult as finding a needle in a haystack. Each has viewed myth from a particular perspective and has placed a different significance on it. Thus, to some scholars, myths are simply the imaginative product of a primitive mind. To others,
2 they are sacred tales that were believed only by those who belonged to a particular tribe or religion; or, they were pure fantasy masquerading as reality, simply an early form of science fiction. Until recently, few scholars in any discipline considered myths to be either literal or symbolic representations of reality, past or present.

Yet, it has been the ways in which myths are real that has kept them meaningful to humankind for thousands of years. If they were merely fantasy or the secret language of a closed society, human beings would have discarded them as irrelevant or trivial. One has only to be aware of the Minoan civilization evident on the island
3 of Crete during the period 2500–1400 B.C. to realize that the mind that created myths was sophisticated enough to create four-story buildings with indoor plumbing and skylights, written records, a system of weights and measures, a calendar based upon astronomical data, and the game of chess.

Far from being merely fantastic or cultish, myths are a treasure of realities—a kaleidoscope which, depending upon the age and experience of the reader, reflects and illuminates his experiences, fantasies, hopes, and fears. Myths have continued to capture the imagination and the soul of man for thousands of years because they
4 depict and reveal behavior and problems common to all human beings. They deal with people who could be alive today, reminding us that human nature has not changed throughout the long course of history. Thus, the ancient myths speak clearly to modern man. They focus directly upon the nature of man, as he was in the past, as he is in the present, and as he will continue to be in the future. They examine how man copes with his physical, social, religious, and political environment.

Multiple-choice Questions, Session 5

38. In paragraph 3, why does the author provide details of the Minoan civilization?

A. He wants to summarize the contribution of ancient Greece.

✔ **B. He wants to show that myths were created by sophisticated minds.**

C. Myths were the secret language of the Minoan civilization.

D. Information from myths was used to create written records.

Related Learning Standard for Question 38: **Learning Standard 13 (p. 78)**

39. What is the main clause of the first sentence in paragraph 4?

A. "Far from being merely fantastic or cultish, . . ."

✔ **B. ". . . myths are a treasure of realities . . ."**

C. ". . . —a kaleidoscope which, depending upon the age and experience of the reader, . . . "

D. ". . . reflects and illuminates his experiences, fantasies, hopes, and fears."

Related Learning Standard for Question 39: **Learning Standard 5 (p. 77)**

40. Which is not stated in the excerpt as a reason why myths are still relevant today?

A. Myths depict problems that are common to all human beings.

B. The continuing nature of man is a main focus of myths.

✔ **C. Science fiction, a form of mythology, is more popular than ever.**

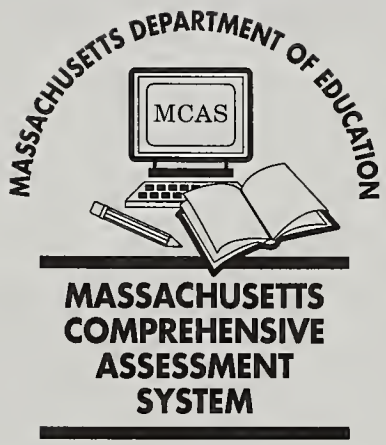
D. How man copes with his environment is examined in myths.

Related Learning Standard for Question 40: **Learning Standard 13 (p. 78)**

Open-response Question, Session 5

41. Using information from the excerpt, explain how myths are relevant to today's world.

Related Learning Standard for Question 41: **Learning Standard 13 (p. 78)**



V. Mathematics, Grade 4

Massachusetts Department of Education

Curriculum Framework *Learning Standards/ MCAS Reporting Categories*

Mathematics, Grade 4

The learning standards in this section are quoted directly from the Massachusetts *Mathematics Curriculum Framework.*[1] The *Framework* identifies four major content strands:

- *Number Sense*
- *Patterns, Relations, and Functions*
- *Geometry and Measurement*
- *Statistics and Probability*

At grade 4, the *Framework* divides each of the first three strands into multiple substrands. The substrand headings and the *Statistics and Probability* strand heading also serve as MCAS reporting categories. Learning standards are grouped below under these reporting category headings. Applicable *Framework* page numbers are given in parentheses following the headings.

Each common item in the second section of this chapter is followed by a reference to the reporting category that contains the learning standard(s) to which the item is related.

Number Sense

Number Sense and Numeration (*Framework* p. 34)

Students engage in problem solving, communicating, reasoning, and connecting to

- construct number meaning by using manipulatives and other physical materials to represent concepts of numbers in the real world.
- demonstrate an understanding of our numeration system by relating counting, grouping, and place value concepts.
- interpret the multiple uses of numbers by taking real-world situations and translating them into numerical statements.

Concepts of Whole Number Operations (*Framework* p. 35)

Students engage in problem solving, communicating, reasoning, and connecting to

- model and discuss a variety of problem situations to help students move from the concrete to the abstract.
- relate the mathematical language and symbolism of operations to problem situations.
- identify a variety of problem structures that can be represented by a single operation.
- know when to use the operations of addition, subtraction, multiplication, and division; and describe their relationships.

[1] Massachusetts Department of Education, *Mathematics Curriculum Framework: Achieving Mathematical Power* (Malden, 1996).

Fractions and Decimals (*Framework* p. 36)

Students engage in problem solving, communicating, reasoning, and connecting to

- demonstrate an understanding of the basic concepts of fractions, mixed numbers, and decimals.
- use models to relate fractions to decimals, find equivalent fractions, and explore operations on fractions and decimals.
- apply fractions and decimals to problem situations.

Estimation (*Framework* p. 37)

Students engage in problem solving, communicating, reasoning, and connecting to

- describe the strategies used in exploring estimation.
- determine when an estimate is appropriate.
- apply estimation when working with quantities, measurement, and computation.
- use estimation to check solutions to determine if the results of computational problems make sense.

Whole Number Computation (*Framework* p. 38)

Students engage in problem solving, communicating, reasoning, and connecting to

- model, explain, and develop proficiency with basic facts and algorithms.
- use calculators in appropriate computational situations.

Patterns, Relations, and Functions

Patterns and Relationships (*Framework* p. 57)

Students engage in problem solving, communicating, reasoning, and connecting to

- identify, describe, extend, and create a wide variety of patterns.
- represent and describe mathematical relationships.
- explore the use of variables and open sentences to express relationships.
- use patterns and relationships to analyze mathematical situations.

Algebra/Mathematical Structure (*Framework* pp. 58-59)

Students engage in problem solving, communicating, reasoning, and connecting to

- discover how to form, then write, number sentences for real problems.
- investigate and describe ways to find missing components in number sentences.
- demonstrate through hands-on activities, an understanding of maintaining balances in number sentences.
- explain the use of variables in number sentences.
- explore and demonstrate an understanding of commutative properties for addition and multiplication.

Geometry and Measurement

Geometry and Spatial Sense (*Framework* p. 72)

Students engage in problem solving, communicating, reasoning, and connecting to

- describe, model, draw, and classify shapes.
- investigate and predict the results of combining, subdividing, and changing shapes.
- develop spatial sense.
- use geometric ideas to develop numerical ideas.
- recognize and appreciate geometry in the world.

Measurement (*Framework* p. 73)

Students engage in problem solving, communicating, reasoning, and connecting to

- demonstrate the attributes of length, capacity, weight, area, volume, time, temperature, and angle.
- use the process of measuring and the concepts related to units of measurement.
- make and use estimates of measurement.
- measure in everyday problem situations.

Statistics and Probability

Statistics and Probability (*Framework* p. 88)

Students engage in problem solving, communicating, reasoning, and connecting to

- collect, organize, and describe data.
- construct, read, and interpret displays of data.
- formulate and solve problems that involve collecting and analyzing data.
- explore and describe the concepts of chance.

MCAS May 1998 Common Test Items

Mathematics, Grade 4

Number of Sessions

Grade 4 MCAS Student Test Booklets contained 3 separate Mathematics test sessions. Each session included multiple-choice, short-answer (except Session 3), and open-response questions.

Formatting in this Document

In this document, all common multiple-choice questions are shown first, followed by common short-answer questions, and then common open-response questions. The test session in which each group of questions appeared is identified before the first question from that session.

Materials are not formatted exactly as they appeared in Student Test Booklets. For instance, in order to present items most efficiently in this document, the following modifications have been made:

- Some fonts and/or font sizes have been changed and/or reduced.
- Some graphics which appeared above questions in Student Test Booklets are shown instead to the side.
- Most graphics have been reduced in actual size from but maintain the same proportions as those that appear in Student Test Booklets.

Correct Answers

Correct answers for **multiple-choice questions** are shown in **bold** and indicated by a check mark.

Correct answers for **short-answer questions** are shown in a [text box] following each question.

An overview of procedures for scoring responses to MCAS **open-response questions** can be found in the MCAS fact sheet, "Facts on Scoring of Student Answers to Open-Response Questions and Writing Prompts," which is available on the Department's Internet site at **www.doe.mass.edu.** Scoring procedures are also explained further in the MCAS document, *Guide to Interpreting the 1998 MCAS School and District Reports,* which is due for release in late fall 1998.

Mathematics Tool Kits

During testing, each grade 4 student was provided with a **Mathematics Tool Kit.** A sample of that Tool Kit is included in Appendix A of this document. No other reference tools or materials were allowed during grade 4 Mathematics testing sessions.

Multiple-choice Questions, Session 1

1. Jaleesa was born in 1962. When she was 20 years old, she decided to go to college. Five years later she started her own business. How can you find out what year Jaleesa started her business?

✔ A. 1962 + 20 + 5

B. 1962 – 20 – 5

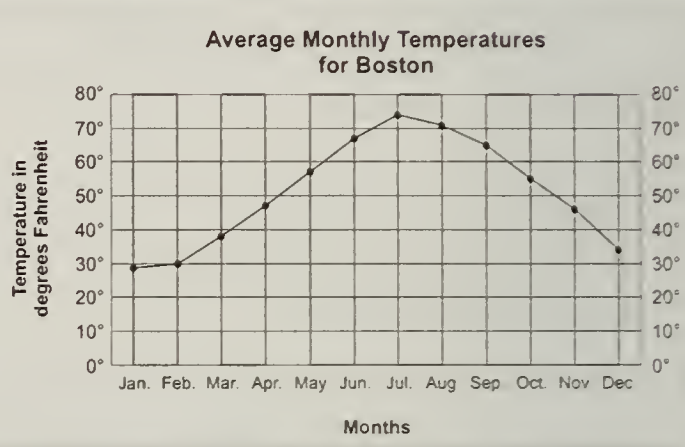
C. 1962 + 20 – 5

D. 1962 – 20 + 5

Reporting Category for Question 1: **Concepts of Whole Number Operations (p. 109)**

Use the graph to answer question 2.

2. What is the average temperature for October?



A. 45°F

B. 50°F

✔ C. 55°F

D. 60°F

Reporting Category for Question 2: **Statistics and Probability (p. 112)**

Question 3 is about Track and Field Day at Central Elementary School. All students participate in events for their class.

3. A class must finish all six events in EXACTLY four hours. The class should have the same amount of time for each event. How much time can the class spend at each event?

A. 20 minutes

B. 30 minutes

✔ C. **40 minutes**

D. 60 minutes

Reporting Category for Question 3: **Measurement (p. 111)**

Question 4 is about Track and Field Day at Central Elementary School. All students participate in events for their class.

4. The chart below shows the number of points awarded for first, second, third, and fourth place.

Place	Points
First Place	10
Second Place	7
Third Place	5
Fourth Place	2

Mr. Hall's class came in first in the 50-yard dash, fourth in the 3-legged race, second in the obstacle course, first in the Frisbee toss, and fourth in the water relay. There is one more event. The class wants to reach a total score of 36 points. What place do they need to win in order to reach their goal of 36 total points?

A. second place

✔ **B. third place**

C. fourth place

D. They have already scored 36 points.

Reporting Category for Question 4: **Whole Number Computation (p. 110)**

5. Mr. Hall is providing orange slices for the 27 students in his class.

- Each student will receive 2 slices.
- He plans to cut each orange into 4 slices.

How many oranges will Mr. Hall need?

A. 11

B. 12

C. 13

✔ **D. 14**

Reporting Category for Question 5: **Whole Number Computation (p. 110)**

Multiple-choice Questions, Session 2

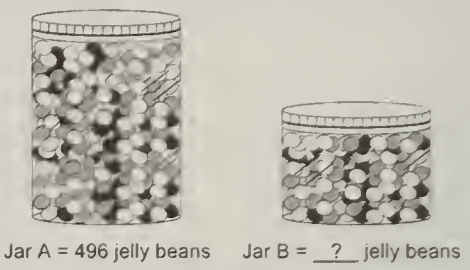
6. Which is the BEST ESTIMATE for the number of jelly beans in Jar B?

✔ A. 250

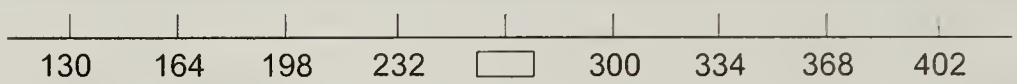
B. 300

C. 200

D. 350



Reporting Category for Question 6: **Estimation (p. 110)**



7. Which number belongs in the box on the number line above?

A. 296

B. 286

✔ C. 266

D. 246

Reporting Category for Question 7: **Number Sense and Numeration (p. 109)**

8. Sean gets up at 7:15 A.M. It takes him
   - 20 minutes to wash and dress
   - 15 minutes to eat breakfast
   - 5 minutes to brush his teeth
   - 5 minutes to gather school books
   - 5 minutes to walk to the bus stop

   If he did all these things, what is the EARLIEST time Sean could arrive at the bus stop?

A. 7:55 A.M.

B. 8:00 A.M.

✔ C. 8:05 A.M.

D. 8:15 A.M.

Reporting Category for Question 8: **Measurement (p. 111)**

9. If ○○ = □, which of the following is true?

   A. ○○○ = □
   B. ○○ = □□
   C. ○○○○○ = □□
   ✔ D. ○○○○○○ = □□□

Reporting Category for Question 9: **Algebra/Mathematical Structure (p. 111)**

10. This shape has no flat faces and no corners. It looks the same from all directions. What shape is it?

   ✔ **A. sphere**
   B. cone
   C. cylinder
   D. pyramid

Reporting Category for Question 10: **Geometry and Spatial Sense (p. 111)**

11. Ellen was thinking of two numbers. She said,

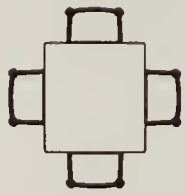
> The sum of the numbers is 10.
> Their product is 16.
> When you subtract the smaller from the larger, the difference is 6.
> When you divide the larger by the smaller, the quotient is 4.

What are the two numbers Ellen is thinking of?

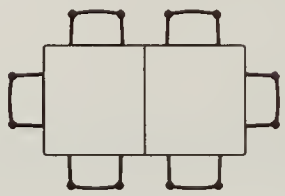
   A. 6 and 4
   B. 7 and 3
   ✔ C. 8 and 2
   D. 10 and 6

Reporting Category for Question 11: **Whole Number Computation (p. 110)**

12. Thomas is setting up tables for a banquet. He knows that four people can sit around this table.



When he puts two of these tables together, he can seat six people.



How many people can Thomas seat if he puts three tables together?

A. 6

✔ B. 8

C. 10

D. 12

Reporting Category for Question 12: **Measurement (p. 111)**

13. I am a number.
When you switch my ten thousand digit with my hundred digit, I become 804,963.
What number am I?

A. 849,063

✔ B. 894,063

C. 809,463

D. 840,963

Reporting Category for Question 13: **Number Sense and Numeration (p. 109)**

14. Which sign belongs in the box to make the number sentence true?

$$196 \div 7 = 14 \square 2$$

✔ A. $\times$

B. $\div$

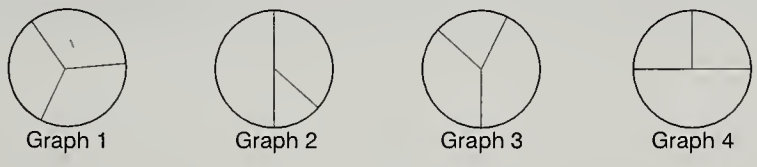
C. $+$

D. $-$

Reporting Category for Question 14: **Patterns and Relationships (p. 110)**

15. In Ms. Jones' class of 36 students,
    - 12 students walk to school,
    - 18 students take the bus to school, and
    - 6 students are driven to school.

    Which circle graph represents Ms. Jones' class?



A. Graph 1

✔ **B. Graph 2**

C. Graph 3

D. Graph 4

Reporting Category for Question 15: **Statistics and Probability (p. 112)**[2]

[2] Results from question 15 were not included in scores for students who took the Spanish-language version of MCAS.

The toy store made a survey of favorite toys. These were the results.

Number of Votes

Action figures	𝍸 𝍸 III
Stuffed animals	𝍸 II
Dolls	𝍸 𝍸 𝍸
Video games	𝍸 𝍸 𝍸 IIII
Building blocks	𝍸 I
Cars, trucks, and trains	𝍸 III

16. Which statement about the survey is true?

A. Stuffed animals and action figures received the fewest number of votes.

B. Dolls and action figures received the most votes.

C. Most children voted for dolls and building blocks as their favorite toys.

✔ D. Half of the votes were for video games and dolls as the favorite toys.

Reporting Category for Question 16: **Statistics and Probability (p. 112)**

Multiple-choice Questions, Session 3

$$\begin{array}{r} {\scriptstyle 1} \\ 245 \\ 23 \\ +\ 19 \\ \hline 287 \end{array}$$

17. Stan added the figures above. What does the "1" he wrote at the top of the second column mean?

✔ **A. ten regrouped**

B. one borrowed

C. remainder of one

D. one more than 10

Reporting Category for Question 17: **Concepts of Whole Number Operations (p. 109)**

18. Chris has 7 blocks in a bag. Four of the blocks are yellow. If Chris picks a block without looking, what are the chances he will pick a yellow block?

A. 1 out of 4

B. 1 out of 7

C. 3 out of 7

✔ **D. 4 out of 7**

Reporting Category for Question 18: **Statistics and Probability (p. 112)**

19. Katie's dog eats about 28 pounds of dog food each month. Which is the best estimate of the amount of dog food her dog will eat in a year?

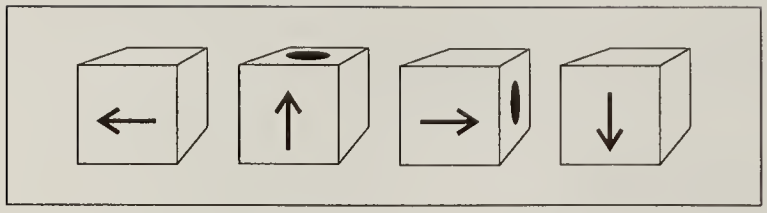
✔ **A. 350 pounds**

B. 200 pounds

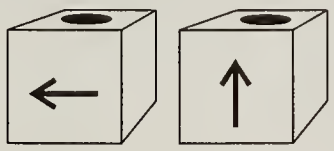
C. 500 pounds

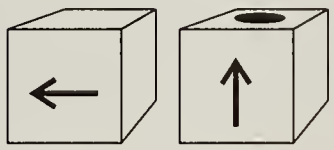
D. 450 pounds

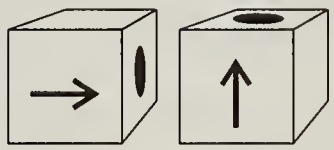
Reporting Category for Question 19: **Estimation (p. 110)**

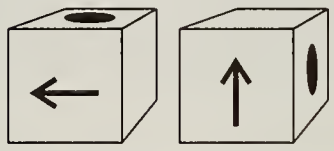


20. Which two figures come next in the pattern?

A. 

✔ B. 

C. 

D. 

Reporting Category for Question 20: **Geometry and Spatial Sense (p. 111)**

21. Some insects can lift objects that weigh 50 times their own weight. If a fourth grader who weighs 70 pounds could do the same, how much could she lift?

A. 120 pounds

B. 350 pounds

C. 1,200 pounds

✔ **D. 3,500 pounds**

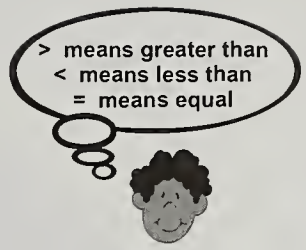
Reporting Category for Question 21: **Patterns and Relationships (p. 110)**

Short-answer Questions, Session 1

22. Copy the number sentence below into the answer box for question 22 in your Student Answer Booklet.

$\frac{4}{5}$ ◯ $\frac{2}{7}$

Compare the numbers by writing >, <, or = in the circle you drew.



Correct Answer: >

Reporting Category for Question 22: **Fractions and Decimals (p. 110)**

23. Write a number sentence to show how to solve the problem in the box. Be sure to include the answer in your number sentence.

Marianne has 27 baseball cards. Dave has 36 baseball cards. How many more baseball cards does Dave have than Marianne?

Correct Answers: 27 + 9 = 36
36 – 27 = 9
36 – 9 = 27

Reporting Category for Question 23: **Algebra/Mathematical Structure (p. 111)**

24. Write the RULE to find the next number in this pattern.

90, 87, 84, 81, ____

Correct Answers: subtract 3
–3
minus 3

Reporting Category for Question 24: **Patterns and Relationships (p. 110)**

Short-answer Questions, Session 2

25. On a number line, 0.8 is closest to which of the following: 0, $\frac{1}{2}$, or 1?

Correct Answer: 1

Reporting Category for Question 25: **Fractions and Decimals (p. 110)**

I have four sides.
Two of my sides are parallel.
My other two sides are not parallel.

26. Draw me in the Answer Box for question 26 on page 17 of your Student Answer Booklet.

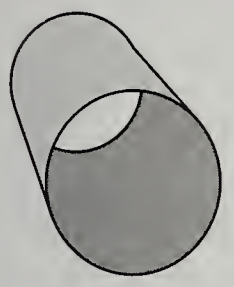
Correct Answer: _____

or any other trapezoid

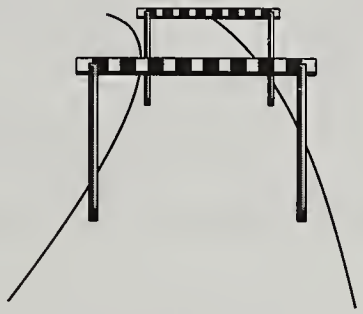
Reporting Category for Question 26: **Geometry and Spatial Sense (p. 111)**

Open-response Questions, Session 1

Question 27 is an open-response question about Track and Field Day at Central Elementary School.



Station C



Station H

Station T

27. The obstacle course has three different stations.
    - crawl through a cylinder (Station C)
    - jump hurdles (Station H)
    - run through tires (Station T)

Maggie and Rob are in charge of deciding the order of the stations.

a. List ALL the DIFFERENT ways they can arrange the stations.

b. Explain how you know that you found all the ways.

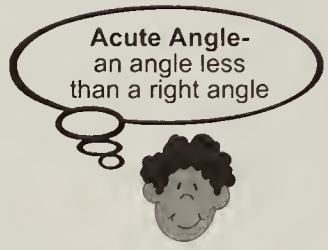
Reporting Category for Question 27: **Statistics and Probability (p. 112)**

28. To answer parts a through d, connect dots on the dot patterns in your Student Answer Booklet *[example shown below]*. Always connect the dots to draw closed shapes with STRAIGHT SIDES.

    a. On the dot pattern labeled Part a, draw a shape that has EXACTLY ONE right angle. DRAW A RING around the RIGHT ANGLE.

    b. On the dot pattern labeled Part b, draw a shape that has NO right angles.

    c. On the dot pattern labeled Part c, draw a shape that has at least ONE acute angle. DRAW A RING around the ACUTE ANGLE.



    d. On the dot pattern labeled Part d, draw a shape that has EXACTLY TWO right angles. DRAW A RING around each RIGHT ANGLE.

Part a

Part b

Part c

Part d

Reporting Category for Question 28: **Geometry and Spatial Sense (p. 111)**

29. Triangles and trapezoids were used to make a pattern.

Level 1:

Level 2:

Level 3:

a. In your Student Answer Booklet, fill in the chart *[example shown below]* to show how many triangles and trapezoids are used to build each level. Decide how many triangles and trapezoids would be needed to build levels 4 and 5. The first level has been completed for you.

b. If the pattern above continues, how many TRIANGLES are needed to build level 10? Explain how you know you are right.

c. If the pattern above continues, how many TRAPEZOIDS are needed to build level 10? Explain how you know you are right.

	Number of ▲	Number of ⏢
Level 1	2	1
Level 2		
Level 3		
Level 4		
Level 5		

Reporting Category for Question 29: **Patterns and Relationships (p. 110)**

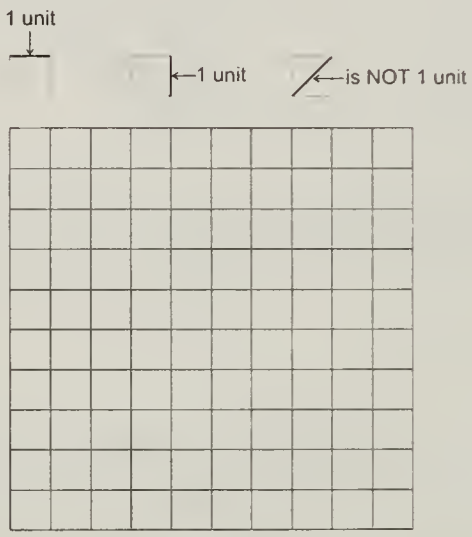
Open-response Question, Session 2

30. The City Park Committee wants to fence in an area of the neighborhood park for young children to use as a playground. It has 12 sections of fence. Each section of fence is one unit long.

    a. On the grid on page 18 of your Student Answer Booklet *[example shown below]*, draw 4 DIFFERENT closed shapes using all 12 sections of fence.

    b. What is the AREA of each of your shapes? WRITE THE AREA INSIDE EACH SHAPE.

    c. Decide which shape would be the best one for a playground. CIRCLE YOUR CHOICE. Explain why this is the best shape for a playground.



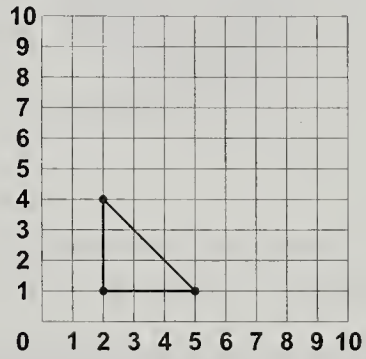
Reporting Category for Question 30: **Measurement (p. 111)**

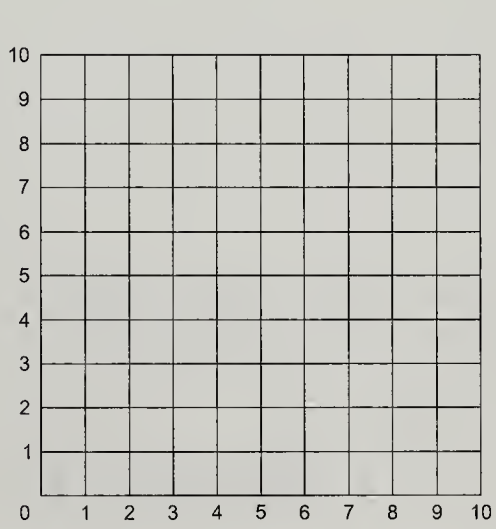
Open-response Questions, Session 3

31. a. Use the grid on page 19 of your Student Answer Booklet *[example shown below]* to plot the ordered pairs below. Connect the points in the order listed.

(1,5), (3,4), (4,1), (5,4), (7,5), (5,6), (4,8), (3,6), (1,5)

b. List the ordered pairs for the corners of the figure below.





Reporting Category for Question 31: **Patterns and Relationships (p. 110)**

32. Nadine was playing a "Guess My Number" game with her mother. The first clue she told her mother was, "I am thinking of a three-digit whole number that has the digits 1, 5, and 8."

    a. List all of the numbers that Nadine could be thinking of.

    Nadine's next clue was this: "My number is also a multiple of 5."

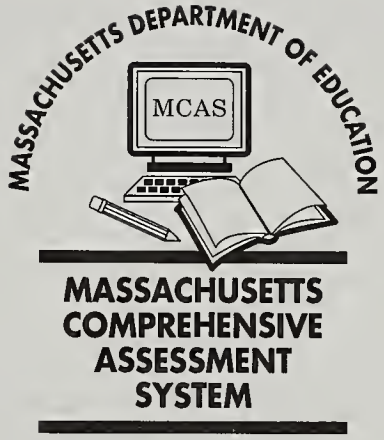
    b. List all of the numbers that Nadine could be thinking of now.

    Finally Nadine told her mother the last clue: "When my number is rounded to the nearest hundred, it is 200."

    c. What is Nadine's number?

    d. Write three clues for another number game and number your clues. The game must have ONLY ONE CORRECT ANSWER. Write the answer.

Reporting Category for Question 32: **Number Sense and Numeration (p. 109)**



VI. Mathematics, Grade 8

Massachusetts Department of Education

Curriculum Framework *Learning Standards/ MCAS Reporting Categories*

Mathematics, Grade 8

The learning standards in this section are quoted directly from the Massachusetts *Mathematics Curriculum Framework*.[1] The Framework identifies four major content strands:

- *Number Sense*
- *Patterns, Relations, and Functions*
- *Geometry and Measurement*
- *Statistics and Probability*

At grade 8, the *Framework* divides each strand into multiple substrands. These substrand headings also serve as MCAS reporting categories. Learning standards are grouped below under these reporting category headings. Applicable *Framework* page numbers are given in parentheses following the headings.

Each common item in the second section of this chapter is followed by a reference to the reporting category that contains the learning standard(s) to which the item is related.

Number Sense

Number and Number Relationships (*Framework* p. 40)

Students engage in problem solving, communicating, reasoning, and connecting to

- represent and use equivalent forms of numbers, including integers, fractions, decimals, percents, exponents, and scientific notation.
- apply ratios, proportions, and percents.
- investigate and describe the relationships among fractions, decimals, and percents.
- represent numerical relationships in one- and two-dimensional graphs.

[1] Massachusetts Department of Education, *Mathematics Curriculum Framework: Achieving Mathematical Power* (Malden, 1996).

Number Systems and Number Theory (*Framework* p. 41)

Students engage in problem solving, communicating, reasoning, and connecting to

- explain the need for numbers other than whole numbers.
- know and use order relations for whole numbers, fractions, decimals, integers, and rational numbers.
- use operations involving fractions, decimals, integers, and rational numbers.
- demonstrate how basic operations are related to one another.
- create and apply number theory concepts, including prime numbers, factors, and multiples.

Computation and Estimation (*Framework* p. 42)[2]

Students engage in problem solving, communicating, reasoning, and connecting to

- compute with whole numbers, fractions, decimals, integers, and rational numbers.
- develop, analyze, and explain procedures for computing, estimating, and solving proportions.
- select and use an appropriate method for computing from among mental arithmetic, paper-and-pencil, calculator, and computer methods.
- use computation, estimation, and proportions to solve problems.
- estimate to check the reasonableness of results of computations and problems involving rational numbers.

Ratio, Proportion, Percent (*Framework* p. 42)[3]

Students engage in problem solving, communicating, reasoning, and connecting to

- compute with whole numbers, fractions, decimals, integers, and rational numbers.
- develop, analyze, and explain procedures for computing, estimating, and solving proportions.
- select and use an appropriate method for computing from among mental arithmetic, paper-and-pencil, calculator, and computer methods.
- use computation, estimation, and proportions to solve problems.
- estimate to check the reasonableness of results of computations and problems involving rational numbers.

[2] The *Mathematics Curriculum Framework* substrand, *Computation and Estimation,* has been divided into two reporting categories for grade 8: *Computation and Estimation* and *Ratio, Proportion, Percent.* See the MCAS document, *Guide to the Massachusetts Comprehensive Assessment System: Mathematics,* pages 67 and 71, for further information about the different assessment expectations for these two reporting categories.

[3] See note 2.

Patterns, Relations, and Functions

Patterns and Functions (*Framework* p. 60)

Students engage in problem solving, communicating, reasoning, and connecting to

- describe, extend, analyze, and create a wide variety of patterns.
- describe and represent relationships with models, tables, graphs, and rules, using sentences and algebraic expressions.
- analyze functional relationships to explain how a change in one quantity results in a change in another.
- use patterns and functions to represent and solve problems.

Algebra (*Framework* p.61)

Students engage in problem solving, communicating, reasoning, and connecting to

- understand and apply the concepts of variable, expression, and equation.
- represent situations and number patterns with tables, graphs, verbal rules, and equations and explore the interrelationships of these representations.
- analyze tables and graphs to identify properties and relationships.
- demonstrate an ability to solve linear equations, using concrete, informal, and formal methods.
- describe the strategies used to explore inequalities and nonlinear equations.
- apply algebraic methods to solve a variety of real-world and theoretical problems.
- construct expressions or equations that model problems.
- explore and describe a variety of ways to solve equations, including hands-on activities, trial and error, and numerical analysis.
- know and apply algebraic procedures for solving equations and inequalities.

Geometry and Measurement

Geometry (*Framework* p. 75)

Students engage in problem solving, communicating, reasoning, and connecting to

- identify, describe, compare, and classify geometric figures.
- explore and describe the properties of points, lines, and planes.
- visualize and draw geometric figures.
- explore and describe transformations of geometric figures.
- represent and solve problems, using geometric models.
- apply geometric properties and relationships.
- develop and explain the concept of π.
- develop and explain the concept of the Pythagorean theorem.

Measurement (*Framework* p. 76)[4]

Students engage in problem solving, communicating, reasoning, and connecting to

- select appropriate units and tools to measure to the degree of accuracy required in a particular situation.
- describe the meaning of perimeter, area, volume, angle measure, capacity, density, weight, and mass.
- develop and describe the concepts of rates and other derived and indirect measurements.
- develop and apply formulas and procedures for determining measures to solve problems.

Geometric Measurement (*Framework* p. 76)[5]

Students engage in problem solving, communicating, reasoning, and connecting to

- select appropriate units and tools to measure to the degree of accuracy required in a particular situation.

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[4] The *Mathematics Curriculum Framework* substrand, *Measurement,* has been divided into two reporting categories for grade 8: *Measurement* and *Geometric Measurement.* See the MCAS document, *Guide to the Massachusetts Comprehensive Assessment System: Mathematics,* pages 86 and 90, for further information about the different assessment expectations for these two reporting categories.

[5] See note 4.

- describe the meaning of perimeter, area, volume, angle measure, capacity, density, weight, and mass.
- develop and describe the concepts of rates and other derived and indirect measurements.
- develop and apply formulas and procedures for determining measures to solve problems.

Statistics and Probability

Statistics (*Framework* p. 90)

Students engage in problem solving, communicating, reasoning, and connecting to

- collect, organize, and describe data systematically.
- construct, read, and interpret tables, charts, and graphs.
- make inferences and convincing arguments that are based on data analysis.
- evaluate arguments that are based on data analysis.
- develop and explain why statistical methods are powerful aids for decision making.

Probability (*Framework* p. 91)

Students engage in problem solving, communicating, reasoning, and connecting to

- model situations by devising and carrying out experiments or simulations to determine probabilities.
- construct a sample space to determine probabilities.
- describe the power of using a probability model by comparing experimental results with mathematical expectations.
- make predictions that are based on experimental or theoretical probabilities and determine their reasonableness.
- develop and explain an appreciation for the pervasive use of probability in the real world.

MCAS May 1998 Common Test Items

Mathematics, Grade 8

Number of Sessions

Grade 8 MCAS Student Test Booklets contained 3 separate Mathematics test sessions. Each session included multiple-choice, short-answer (except Session 2), and open-response questions.

Formatting in this Document

In this document, all common multiple-choice questions are shown first, followed by common short-answer questions, and then common open-response questions. The test session in which each group of questions appeared is identified before the first question from that session.

Materials are not formatted exactly as they appeared in Student Test Booklets. For instance, in order to present items most efficiently in this document, the following modifications have been made:

- Some fonts and/or font sizes have been changed and/or reduced.
- Some graphics which appeared above questions in Student Test Booklets are shown instead to the side.
- Most graphics have been reduced in actual size from but maintain the same proportions as those that appear in Student Test Booklets.

Correct Answers

Correct answers for multiple-choice questions are shown in **bold** and indicated by a check mark.

Correct answers for short-answer questions are shown in a [text box] following each question.

An overview of procedures for scoring responses to MCAS open-response questions can be found in the MCAS fact sheet, "Facts on Scoring of Student Answers to Open-Response Questions and Writing Prompts," which is available on the Department's Internet site at www.doe.mass.edu. Scoring procedures are also explained further in the MCAS document, *Guide to Interpreting the 1998 MCAS School and District Reports,* which is due for release in late fall 1998.

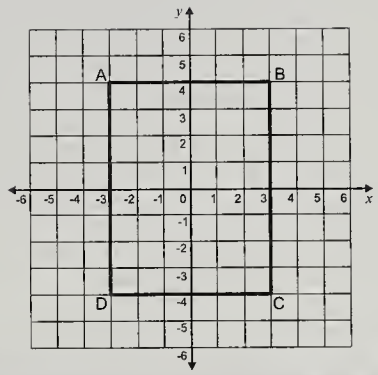
Reference Materials and Tools

During testing, each grade 8 student was provided with a Mathematics Reference Sheet. A sample of the Grade 8 Mathematics Reference Sheet is included in Appendix A of this document.

During Sessions 2 and 3, each grade 8 student was allowed to use a personal calculator while answering test questions. If any student could not provide his or her own calculator with at least four functions and a square root key, one was provided to that student for use during those sessions. Calculator use was not allowed during Session 1. No other reference tools or materials were allowed during any grade 8 Mathematics testing session.

Multiple-choice Questions, Session 1

1. Which vertex of the rectangle has the coordinates (–3,4)?



✔ **A. vertex A**

B. vertex B

C. vertex C

D. vertex D

Reporting Category for Question 1: **Algebra (p. 135)**

2. Each band member had 12 tickets to sell to the spring concert.

Jamie sold $\frac{2}{3}$ of his tickets.

Kim sold $\frac{1}{2}$ of hers.

Matt sold $\frac{3}{4}$ of his.

Sally sold $\frac{7}{12}$ of hers.

Who sold the most tickets?

A. Jamie

B. Kim

✔ C. Matt

D. Sally

Reporting Category for Question 2: **Number Systems and Number Theory (p. 134)**

3. 49% of 840 is

A. a little less than 350.

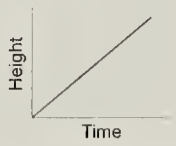
✔ **B. a little less than 420.**

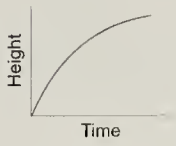
C. a little more than 420.

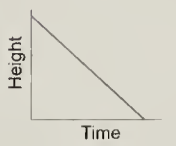
D. a little more than 650.

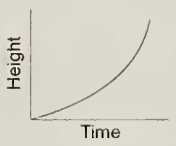
Reporting Category for Question 3: **Ratio, Proportion, Percent (p. 134)**

4. Kendra is observing how the height of a tall, thin cylindrical candle changes over time as it burns.
Which graph best represents the changes in the height of the candle over time?

A. 

B. 

✔ C. 

D. 

Reporting Category for Question 4: **Patterns and Functions (p. 135)**

5. According to the 1990 census, the population of Massachusetts was 6,016,425.
Approximately what percent of those people lived in Boston?

✔ A. 10%

B. 20%

C. 30%

D. 40%

Population of Cities in Massachusetts

City	Population
Boston	574,283
Cambridge	95,802
Fall River	92,703

Reporting Category for Question 5: **Ratio, Proportion, Percent (p. 134)**

6. Which of the following **must** be true of any number that is evenly divisible by 6?

   I. It is divisible by 3.

   II. It is an even number.

   III. Its units digit is 6.

   IV. The sum of its digits is 6.

   A. I and IV

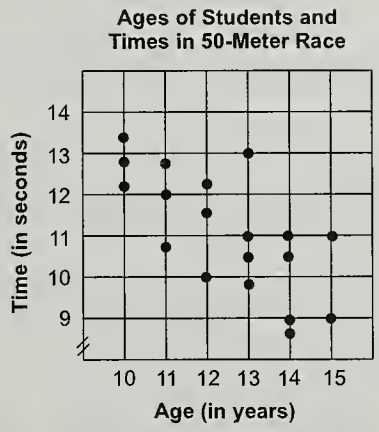
   ✔ **B. I and II**

   C. II and III

   D. II and IV

Reporting Category for Question 6: **Number Systems and Number Theory (p. 134)**

7. In the scattergram, each dot represents one student who participated in the 50-meter race. Vicki won the race. According to the scattergram, how old is Vicki?



   A. 10 years old

   B. 13 years old

   ✔ **C. 14 years old**

   D. 15 years old

Reporting Category for Question 7: **Statistics (p. 137)**

8. Joelyn has decided to save $12 a week to buy a stereo system costing $125. Which expression shows how much she will still have to save after n weeks?

   A. $125 + 12n$

   ✔ **B. $125 - 12n$**

   C. $(125 + 12)n$

   D. $(125 - 12)n$

Reporting Category for Question 8: **Algebra (p. 135)**

9. Which equation states a rule for this table?

Input (x)	Output (y)
3	$^{-}2$
1	6
6	$^{-}14$

A. $y = x - 5$

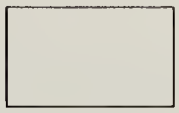
B. $y = 2x + 4$

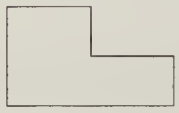
✔ C. $y = {}^{-}4x + 10$

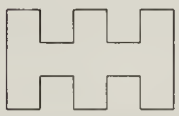
D. $y = x + 8$

Reporting Category for Question 9: **Algebra (p. 135)**

10. Which of the figures below has the greatest area?

✔ A. 

B. 

C. 

D.

Reporting Category for Question 10: **Measurement (p. 136)**

11. Tom turned these cards face down and mixed them up. What is the probability that the first card he picks up will be an S?

A. $\frac{4}{9}$

✔ B. $\frac{4}{13}$

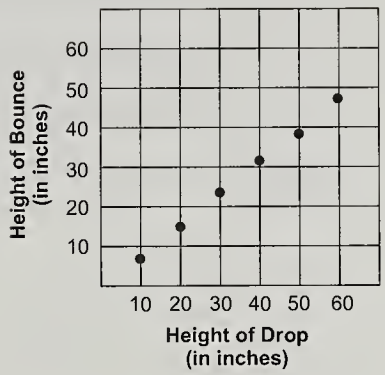
C. $\frac{1}{2}$

D. $\frac{1}{4}$

Reporting Category for Question 11: **Probability (p. 137)**

Multiple-choice Questions, Session 2

12. Linda and Kwame dropped a rubber ball from various heights and measured the height of the first bounce. They recorded their data in this graph.



Which statement is true based on their data?

✔ **A. The ball bounces about $\frac{3}{4}$ as high as the height from which it was dropped.**

B. The ball bounces about $1\frac{1}{3}$ times as high as the height from which it was dropped.

C. The ball bounces about 5 inches less than the height from which it was dropped.

D. The ball bounces about 5 inches higher than the height from which it was dropped.

Reporting Category for Question 12: **Patterns and Functions (p. 135)**

13. Monique is making a scale model of the Eiffel Tower. The measurements of the real Eiffel Tower are shown.

Monique's model will be 12 inches tall. About how long should each side of the model's square base be?

A. 2 in.

B. 3 in.

✔ **C. 4 in.**

D. 5 in.

Reporting Category for Question 13: **Ratio, Proportion, Percent (p. 134)**

14. Mr. Hong took a survey in which he asked each of the 30 students in his math class to choose his or her favorite food. He tallied the results in this chart.

    Mr. Hong wants to construct a circle graph for this data. What should be the measure of the angle for the section of the graph for hamburgers?

Favorite Food

Food	Number of Students Choosing Food
Tacos	𝍸 I
Pizza	𝍸 IIII
French Fries	III
Hot Dogs	IIII
Hamburgers	𝍸 III

A. 40°

B. 56°

C. 120°

✔ D. 96°

Reporting Category for Question 14: **Statistics (p. 137)**

15. Manuel is planning a flower garden shaped like a right triangle. He will use an old 16-foot fence for the longest side and an old 8-foot fence for another side as shown.

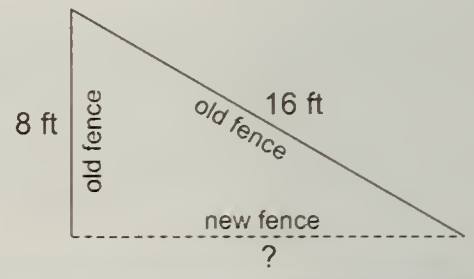
    Which is the **best** estimate of the amount of fencing he will need for the third side?

A. 8 feet

B. 12 feet

C. 24 feet

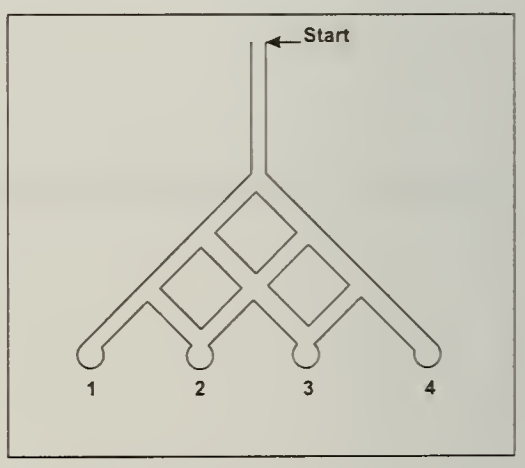
✔ D. 14 feet



Reporting Category for Question 15: **Measurement (p. 136)**

16. Tom made the game board shown at the right.

    Small marbles start at the top and always roll down the marked paths until they land in one of the circles at the bottom. How many different paths can a marble take to land in Circle 2?



A. 2

✔ B. 3

C. 4

D. 6

Reporting Category for Question 16: **Probability (p. 137)**

Multiple-choice Questions, Session 3

17. The Massachusetts Department of Employment and Training predicts that
    - 374,000 new jobs will be created in Massachusetts between 1994 and 2005, and
    - about 2 out of 5 of those jobs will require a college education.

    Based on the information given above, **about** how many of the new jobs will require a college education?

    A. 37,400

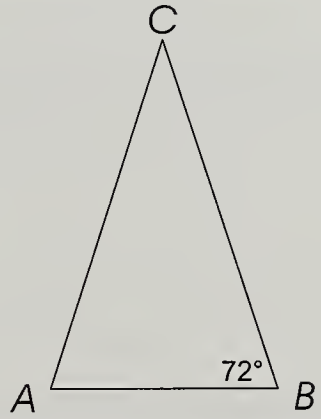
    B. 187,000

    C. 72,800

    ✔ D. 149,600

Reporting Category for Question 17: **Ratio, Proportion, Percent (p. 134)**

18. Triangle ABC is an isosceles triangle in which $\overline{AC} \cong \overline{BC}$.
    What is the measure of $\angle ACB$?



    ✔ A. 36°

    B. 54°

    C. 18°

    D. 48°

Reporting Category for Question 18: **Geometry (p. 136)**

In April of each year, a 26.2-mile race is held in Boston. The 100th Boston Marathon was run in 1996. Record numbers of runners participated in the race—about 38,700 officially registered runners plus about 2,000 other people who also participated. The following are facts about the Marathon.

Category	Winner	Time
Men	Moses Tanui	2 h, 9 min, 16 sec
Women	Uta Pippig	2 h, 27 min, 13 sec
Wheelchair (Women)	Jean Driscoll	1 h, 52 min, 54 sec
Wheelchair (Men)	Heinz Frei	1 h, 30 min, 11 sec

19. Which is the best estimate of Moses Tanui's average speed for the entire marathon in miles per hour?

A. less than 9 mph

✔ **B. about 12 mph**

C. about 15 mph

D. more than 17 mph

Reporting Category for Question 19: **Measurement (p. 136)**

20. How much faster was Jean Driscoll's time in a wheelchair than Moses Tanui's on foot?

A. 1 h, 43 min, 38 sec

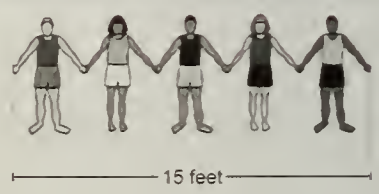
B. 1 h, 52 min, 22 sec

C. 17 min, 38 sec

✔ **D. 16 min, 22 sec**

Reporting Category for Question 20: **Measurement (p. 136)**

21. Suppose that all the runners in the marathon stood side-by-side holding hands, as shown in the diagram.



How would the length of the line of all 40,700 runners compare to the length of the 26.2-mile marathon course?

A. The line would be about $\frac{1}{2}$ the length of the course.

✔ **B. The line would be just a few miles shorter than the length of the course.**

C. The line would be just a few miles longer than the length of the course.

D. The line would be about twice as long as the course.

Reporting Category for Question 21: **Ratio, Proportion, Percent (p. 134)**

Short-answer Questions, Session 1

22. What does x equal in the equation below?

$4x - 2 = 10$

Correct Answer: 3

Reporting Category for Question 22: **Algebra (p. 135)**

23. The distance, d, in feet that a steel marble falls in t seconds is given by this equation.

$d = 16t^2$

Based on this equation, how many feet would the steel marble fall in 10 seconds?

Correct Answer: 1,600

Reporting Category for Question 23: **Algebra (p. 135)**

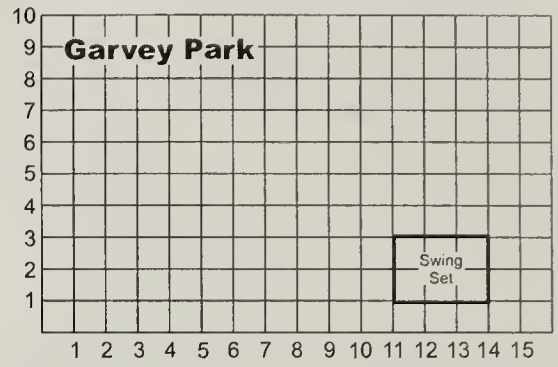
24. Compute:

$3.62 + 49.1 + 56 =$

Correct Answer: 108.72

Reporting Category for Question 24: **Computation and Estimation (p. 134)**

Short-answer Questions, Session 3



25. The swing set in Garvey Park is going to be moved from the place shown on the map to a new location. One corner of the set will be at (3,7) and another corner will be at (6,5). Write the coordinates of the points where the other two corners will be.

Correct Answer: (3,5) and (6,7)

Reporting Category for Question 25: **Geometry (p. 136)**

26. Roberto bought skates marked $69.95. The rate of sales tax is 5%. How much will Roberto have to pay to purchase the skates?

Correct Answers: $73.45
$73.44
$73.4475

Reporting Category for Question 26: **Computation and Estimation (p. 134)**

Open-response Questions, Session 1

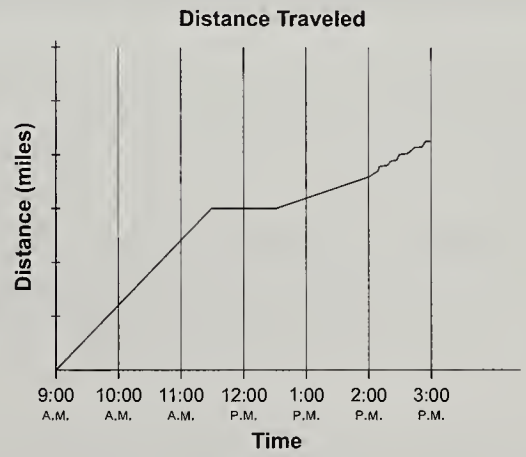
27. Chris spent $9 of the $12 he was given for his birthday.

    - His brother Luis says that Chris has spent exactly $\frac{2}{3}$ of the birthday money.
    - His sister Jessie says that he has spent exactly 0.75 of the money.
    - His other sister Mary says that he has spent exactly 80% of the money.

    Chris wonders who is correct.

    For each of the three—Luis, Jessie, and Mary—tell whether he or she is correct or incorrect. Explain your reasoning.

Reporting Category for Question 27: **Number and Number Relationships (p. 133)**



28. The members of the Bike Club rode from the city to their camp. Sean kept track of how far they had traveled throughout the day and made this graph.

    Write a brief story about their trip that accounts for **all** the changes shown in the graph. Include just enough detail about the different speeds and activities to account for the changes. Be sure to identify the time of each event in your story.

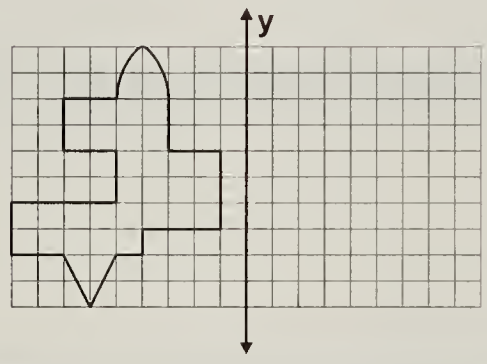
Reporting Category for Question 28: **Patterns and Functions (p. 135)**

Open-response Questions, Session 2

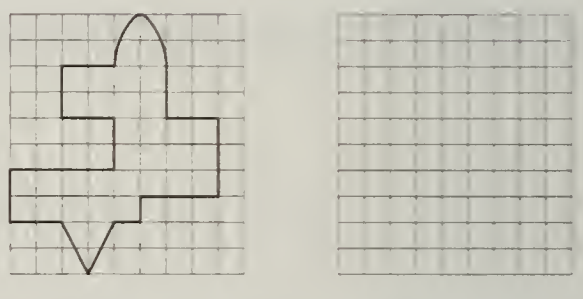
29. a. The figure shown in Part a of your Student Answer Booklet *[shown below]* is to be reflected over line *y*. Draw the reflected figure.

    b. The figure shown in Part b of your Student Answer Booklet *[shown below]* is to be reduced so that its dimensions are $\frac{1}{2}$ their original size. On the blank grid *[shown below]*, draw a copy of the figure that is exactly the same shape but has dimensions that are only $\frac{1}{2}$ of those of the original.

Part a



Part b



Reporting Category for Question 29: **Geometry (p. 136)**

30. The coach for the All-Star Basketball Game needs to pick one of two players for the team. The table below shows the number of points each of the players scored in his last 10 games.

Name of player	Number of points scored in last ten games
Geltz	18, 32, 28, 18, 14, 28, 10, 16, 36, 20
Luna	22, 17, 23, 8, 24, 24, 22, 20, 18, 22

    a. Find the mean (average) number of points scored by each player. Show or describe how you found the means.

    b. Find the median number of points scored by each player. Show or describe how you found the medians.

    c. Based on the data, which player would you recommend for the All-Star team? Explain your recommendation. Use the data and include a comparison of the means and medians you calculated.

Reporting Category for Question 30: **Statistics (p. 137)**

Open-response Questions, Session 3

Question 31 is an open-response question about the 1996 Boston Marathon. You may use the conversions on your Mathematics Reference Sheet [see Appendix A] *to answer question 31.*

31. At the end of every 2nd mile of the Boston Marathon, a typical marathon runner takes about 4 ounces of water. Instead of drinking all the water, the runner sips some of it and then throws the rest on his or her head or body to cool off.

    a. At this rate, about how many **ounces** of water would an average runner take in an entire 26.2-mile marathon? Explain how you found your answer.

    b. At this rate, about how many **pints** of water would an average runner take in an entire 26.2-mile marathon? Explain how you found your answer.

    c. Suppose that all the runners in the Boston Marathon behaved like the "typical" marathon runner described above. About how many **gallons** of water would have been used by the 40,700 runners in the 1996 Boston Marathon? Explain each step you used to find your answer.

Reporting Category for Question 31: **Measurement (p. 136)**

32. Abby saw this definition of the concept of *work* in her science book.

Definition of Work

The amount of work, W, done to lift an object that weighs p pounds through a vertical distance of d feet is given by

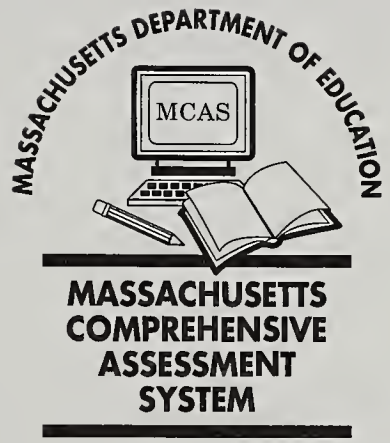
$$W = p \cdot d$$

where W is given in units called foot-pounds.

Bunker Hill Monument

Abby's class is taking a field trip to the Bunker Hill Monument. Abby read that to reach the top of the monument she must climb 294 steps, each of which is 8 inches tall. Abby weighs 130 pounds. How many foot-pounds of work will she have to perform to climb to the top of the monument? Show or describe all the steps you used to find your answer.

Reporting Category for Question 32: **Algebra (p. 135)**



VI. Mathematics, Grade 10

Massachusetts Department of Education

Curriculum Framework *Learning Standards/ MCAS Reporting Categories*

Mathematics, Grade 10

The learning standards in this section are quoted directly from the Massachusetts *Mathematics Curriculum Framework*.[1] The *Framework* identifies four major content strands:

- *Number Sense*
- *Patterns, Relations, and Functions*
- *Geometry and Measurement*
- *Statistics and Probability*

At grade 10, the *Framework* divides each strand into multiple substrands. These substrand headings also serve as MCAS reporting categories. Learning standards are grouped below under these reporting category headings. Applicable *Framework* page numbers are given in parentheses following the headings.

Each common item in the second section of this chapter is followed by a reference to the reporting category that contains the learning standard(s) to which the item is related.

Number Sense

Discrete Mathematics (*Framework* p. 44)

Students engage in problem solving, communicating, reasoning, and connecting to

- represent problem situations, using discrete structures such as finite graphs, matrices, sequences, and recurrence relations.
- represent and analyze finite graphs, using matrices.

Mathematical Structure (*Framework* p. 45)

Students engage in problem solving, communicating, reasoning, and connecting to

- compare and contrast the real number system and its subsystems with regard to structural characteristics.
- demonstrate the logic of algebraic procedures and their interrelationship with geometric ideas and concepts.

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[1] Massachusetts Department of Education, *Mathematics Curriculum Framework: Achieving Mathematical Power* (Malden, 1996).

Estimation (*Framework* p. 46)

Students engage in problem solving, communicating, reasoning, and connecting to

- use estimation strategies to judge the reasonableness of results of computation and problem solving involving real numbers.
- use estimation when making graphs.

Patterns, Relations, and Functions

Algebra (*Framework* p.62)

Students engage in problem solving, communicating, reasoning, and connecting to

- formulate problems that involve variable quantities with expressions, equations, and inequalities.
- use tables and graphs as tools to interpret expressions, equations, and inequalities.
- simplify algebraic expressions to solve equations and inequalities.

Functions (*Framework* p. 63)

Students engage in problem solving, communicating, reasoning, and connecting to

- model real-world phenomena with a variety of functions.
- represent and analyze relationships, using tables, verbal rules, equations, and graphs.
- translate among tabular, symbolic, and graphical representations of functions.

Trigonometry (*Framework* p. 64)

Students engage in problem solving, communicating, reasoning, and connecting to

- apply trigonometry to problem situations involving right triangles.

Geometry and Measurement

Geometry and Spatial Sense (*Framework* p. 78)[2]

Students engage in problem solving, communicating, reasoning, and connecting to

- interpret and draw three-dimensional objects.
- represent problem situations with geometric models and apply properties of figures.
- classify figures in terms of congruence and similarity and apply these relationships.
- deduce properties of, and relationships between, figures from given assumptions.
- develop and defend conclusions.
- formulate counter examples.
- construct proofs for mathematical assertions, including indirect proofs and proofs by mathematical induction.

Measurement (*Framework* p. 78)[3]

Students engage in problem solving, communicating, reasoning, and connecting to

- interpret and draw three-dimensional objects.
- represent problem situations with geometric models and apply properties of figures.
- classify figures in terms of congruence and similarity and apply these relationships.
- deduce properties of, and relationships between, figures from given assumptions.
- develop and defend conclusions.
- formulate counter examples.
- construct proofs for mathematical assertions, including indirect proofs and proofs by mathematical induction.

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[2] The *Mathematics Curriculum Framework* substrand, *Geometry and Spatial Sense,* has been divided into two reporting categories for grade 10: *Geometry and Spatial Sense* and *Measurement.* See the MCAS document, *Guide to the Massachusetts Comprehensive Assessment System: Mathematics,* pages 120 and 123, for further information about the different assessment expectations for these two reporting categories.

[3] See note 2.

Geometry from an Algebraic Perspective (*Framework* p. 79)

Students engage in problem solving, communicating, reasoning, and connecting to

- translate between synthetic and coordinate representations.
- deduce properties of figures, using transformations and coordinates.
- identify congruent and similar figures, using transformations.
- develop and explain geometric interpretations and applications of slope.

Statistics and Probability

Statistics (*Framework* p. 94)

Students engage in problem solving, communicating, reasoning, and connecting to

- construct, draw inferences, and reason with charts, tables, and graphs that summarize data from real-world situations.
- use sampling to recognize and describe its role in statistical claims.
- design a statistical experiment to study a problem, conduct the experiment, and interpret and communicate the outcomes.

Probability (*Framework* p. 95)

Students engage in problem solving, communicating, reasoning, and connecting to

- use simulations to estimate probabilities.
- determine the likelihood of outcomes, using theoretical probabilities.

MCAS May 1998 Common Test Items

Mathematics, Grade 10

Number of Sessions

Grade 10 MCAS Student Test Booklets contained 4 separate Mathematics test sessions. Each session included multiple-choice and open-response questions. Sessions 1 and 2 also included short-answer questions.

Formatting in this Document

In this document, all common multiple-choice questions are shown first, followed by common short-answer questions, and then common open-response questions. The test session in which each group of questions appeared is identified before the first question from that session.

Materials are not formatted exactly as they appeared in Student Test Booklets. For instance, in order to present items most efficiently in this document, the following modifications have been made:

- Some fonts and/or font sizes have been changed and/or reduced.
- Some graphics which appeared above questions in Student Test Booklets are shown instead to the side.
- Most graphics have been reduced in actual size from but maintain the same proportions as those that appear in Student Test Booklets.

Correct Answers

Correct answers for **multiple-choice questions** are shown in **bold** and indicated by a check mark.

Correct answers for **short-answer questions** are shown in a [text box] following each question.

An overview of procedures for scoring responses to MCAS **open-response questions** can be found in the MCAS fact sheet, "Facts on Scoring of Student Answers to Open-Response Questions and Writing Prompts," which is available on the Department's Internet site at **www.doe.mass.edu.** Scoring procedures are also explained further in the MCAS document, *Guide to Interpreting the 1998 MCAS School and District Reports,* which is due for release in late fall 1998.

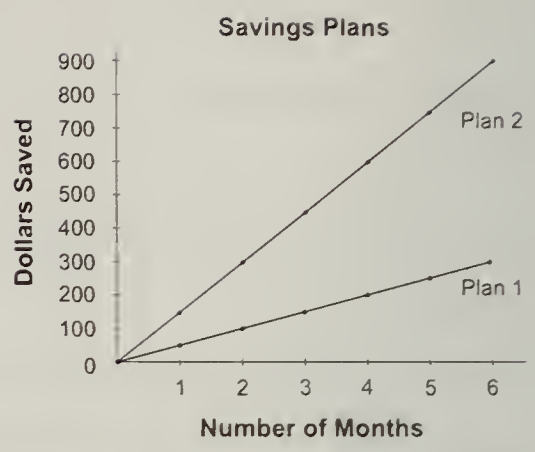
Reference Materials and Tools

During testing, each grade 10 student was provided with a **Mathematics Reference Sheet.** A sample of the Grade 10 Mathematics Reference Sheet is included in Appendix A of this document.

During Sessions 2, 3, and 4, each grade 10 student was allowed to use a personal calculator while answering test questions. If any student could not provide his or her own calculator with at least four functions and a square root key, one was provided to that student for use during those sessions. Calculator use was not allowed during Session 1. No other reference tools or materials were allowed during any grade 10 Mathematics testing session.

Multiple-choice Questions, Session 1

1. The graph shows two savings plans. If the same savings rates are continued, what will be the difference in the amount saved at the end of two years?



A. $ 600

B. $1,200

✔ C. $2,400

D. $3,600

Reporting Category for Question 1: **Functions (p. 156)**

2. (a + b)(c + d) is the same as

A. a + b(c + d)

B. ac + bd

C. (a + b)c + d

✔ D. (a + b) c + (a + b)d

Reporting Category for Question 2: **Mathematical Structure (p. 155)**

3. If the hand of the clock above is rotated in a clockwise direction it moves as follows:

Number of Rotations	Number of Degrees	Clock Hand Location
1	120°	1
2	240°	2
3	360°	0
4	480°	1
5	600°	2

After which of the rotations below will the clock hand be on 1?

A. 63

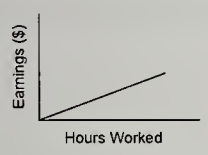
✔ **B. 52**

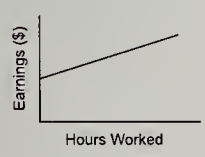
C. 41

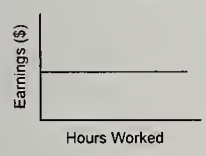
D. 30

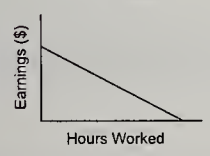
Reporting Category for Question 3: **Mathematical Structure (p. 155)**

4. Which of the graphs most accurately depicts the wages earned with respect to the time worked?

✔ A.


B.


C.


D.


Reporting Category for Question 4: **Statistics (p. 158)**

5. The number of Center High School students who donated money to the United Fund this year was 342. This figure is 110% of the number of students who donated last year. This means that

   A. ten more Center High students donated to the United Fund this year.

   B. the number of Center High students donating to the United Fund decreased from last year to this year.

   C. Center High School raised more money for the United Fund this year than it did last year.

   ✔ **D. the number of Center High School students donating to the United Fund increased from last year to this year.**

Reporting Category for Question 5: **Mathematical Structure (p. 155)**

6. A teacher makes the statement, "If all students pass this test, then there will be no homework on Friday." Which of the following would indicate that the teacher did not follow through with this statement?

   A. All of the students passed the test and they did not have homework on Friday.

   B. All of the students did not pass the test and they had homework on Friday.

   ✔ **C. All of the students passed the test and they had homework on Friday.**

   D. All of the students did not pass the test and they did not have homework on Friday.

Reporting Category for Question 6: **Geometry and Spatial Sense (p. 157)**

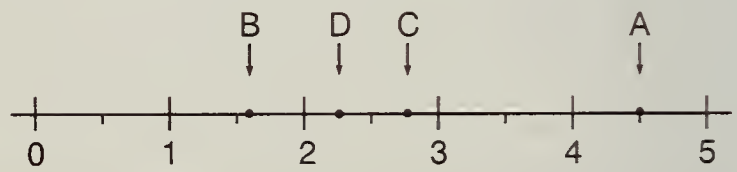
7. Which of the points on the number line below would be the best approximation of the point that is halfway between $\sqrt{2}$ and π?

   A. A

   B. B

   C. C

   ✔ **D. D**



Reporting Category for Question 7: **Estimation (p. 156)**

8. Six students are participating in a fitness program. They are required to work out in pairs. How many **different** combinations of pairs of students are possible?

A. 3

B. 5

✔ C. 15

D. 30

Reporting Category for Question 8: **Probability (p. 158)**

Multiple-choice Questions, Session 2

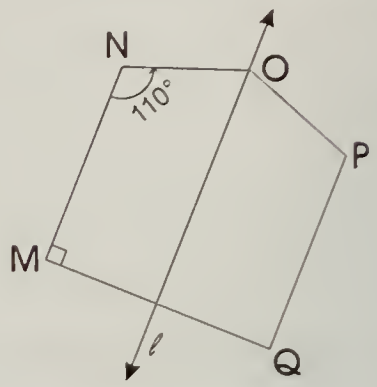
9. The line ℓ is a line of symmetry for figure MNOPQ. What is the measure of $\angle NOP$?

A. 70°

B. 110°

✔ C. 140°

D. 160°



Reporting Category for Question 9: **Geometry and Spatial Sense (p. 157)**

10. A repair service charges $25 to send a service person on a call and $30 per hour for labor. If h stands for the number of hours of labor, which expression below can the company use to compute the charge for the service call?

A. $25h + 30$

B. $55h$

C. $\frac{25}{30h}$

✔ D. $25 + 30h$

Reporting Category for Question 10: **Algebra (p. 156)**

11. A test on a sample of 492 in-line skate wheels identified 3 defective wheels. Based on this rate of defects, **approximately** how many defective wheels will be found per 10,000 wheels?

A. 20

✔ B. 60

C. 100

D. 300

Reporting Category for Question 11: **Statistics (p. 158)**

12. Karl needs to have his car towed to a repair shop. He received the following estimates for towing.

Best Towing . . . . . .$32 plus $2.00 per mile
Ace Towing . . . . . .$26 plus $2.50 per mile
Bert's Towing . . . . .$50 for 0–20 miles
$100 for 21–50 miles

If the distance to the repair shop is 35 miles, what is the least amount he could pay for towing?

A. $70.00

B. $82.50

✔ C. $100.00

D. $102.00

Reporting Category for Question 12: **Mathematical Structure (p. 155)**

Multiple-choice Questions, Session 3

13. One man and two women are seated randomly in a row. What is the mathematical probability that the two women are seated together?

A. $\frac{1}{3}$

B. $\frac{1}{2}$

✔ C. $\frac{2}{3}$

D. $\frac{5}{6}$

Reporting Category for Question 13: **Probability (p.158)**

14. In a bowling tournament, there were 2 scores in the 200s, 6 scores in the 180s, 5 scores in the 160s, 5 in the 150s, and 3 in the 130s. The median score would be in the

A. 150s.

✔ B. 160s.

C. 180s.

D. There is not enough information given.

Reporting Category for Question 14: **Statistics (p. 158)**

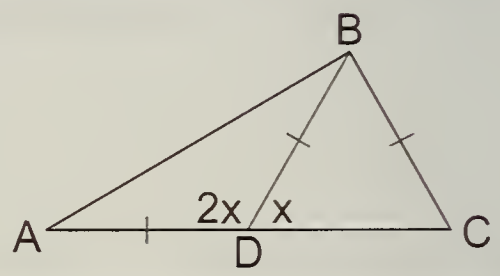
15. If AD = BD = BC and the measure of ∠ADB is twice the measure of ∠BDC, what is the measure of ∠ABC?

A. 70°

B. 80°

✔ C. 90°

D. 100°



Reporting Category for Question 15: **Geometry and Spatial Sense (p. 157)**

16. Which of the following could be the next step in solving the equation $3(x + 2) = 3 - (x + 1)$?

✔ A. $3x + 6 = 3 - x - 1$

B. $3x + 2 = 3 - x - 1$

C. $3x + 6 = 3 - x + 1$

D. $3x + 5 = 3 - x + 1$

Reporting Category for Question 16: **Algebra (p. 156)**

17. The two graphs show Carol's drive from home to school and from school to home.

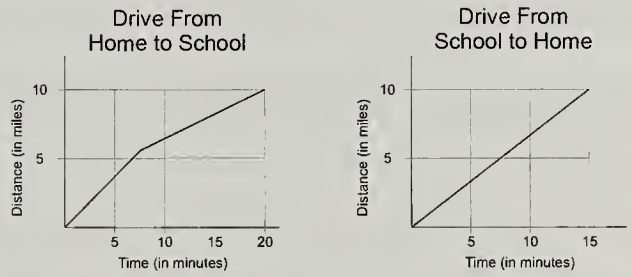
What is the difference in her average speed in miles per hour for the two trips?

A. 5 mph

✔ B. **10 mph**

C. 15 mph

D. 20 mph



Reporting Category for Question 17: **Functions (p. 156)**

18. The table below reflects the number of different handshakes (H) for groups of *n* relatives.

n	7	8	12	20
H	21	28	66	190

For any size gathering of people, which formula gives the correct number of handshakes for *n* people?

A. $H = \frac{n(n + 1)}{2}$

B. $H = \frac{(n - 1)^2}{2}$

✔ C. $H = \frac{n(n - 1)}{2}$

D. $H = \frac{n^2 + 1}{2}$

Reporting Category for Question 18: **Functions (p. 156)**

	A	B	C	D	E
1	2	⁻3	7	1	
2	4	⁻4	8	2	
3	6	⁻5	9	3	
4	8	⁻6	10	4	

19. The spreadsheet above consists of 20 cells. Each cell is identified by its column and row. For example, cell C4 contains the number 10. Using the formula E1 = B3 + 2(C1 + D4), what value should be placed in cell E1?

A. –33

B. –17

C. 13

✔ D. 17

Reporting Category for Question 19: **Mathematical Structure (p. 155)**

20. The lengths of three sides of a triangle are in the ratio of 3:4:5 and the perimeter of the triangle is 48 inches. The length of the longest side of the triangle is

A. 15 inches.

✔ B. 20 inches.

C. 25 inches.

D. 28 inches.

Reporting Category for Question 20: **Geometry and Spatial Sense (p. 157)**

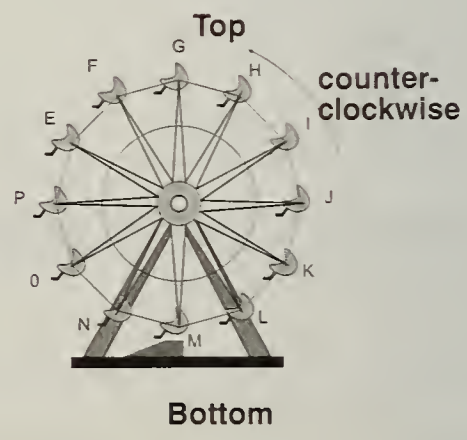
21. The spokes on the Ferris wheel are evenly spaced. After $2\frac{1}{4}$ complete turns how many degrees will car M have traveled?

A. 90°

B. 225°

C. 450°

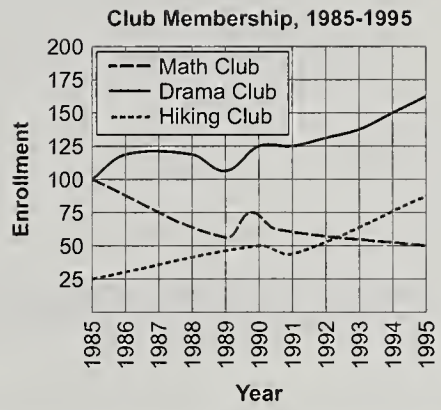
✔ D. 810°



Reporting Category for Question 21: **Geometry and Spatial Sense (p. 157)**

Multiple-choice Questions, Session 4

22. Based on the graph, which organization showed the most growth in membership over the 10-year period?



A. the Math Club

B. the Hiking Club

C. the Drama Club

✔ **D. The Drama Club and the Hiking Club are tied for the most growth.**

Reporting Category for Question 22: **Statistics (p. 158)**

23. 60% of the cars owned by Best Car Rental are white and 30% have a standard transmission. If you randomly choose a rental car, what is the probability that you will get a white car **with** a standard transmission?

A. $\frac{9}{10}$

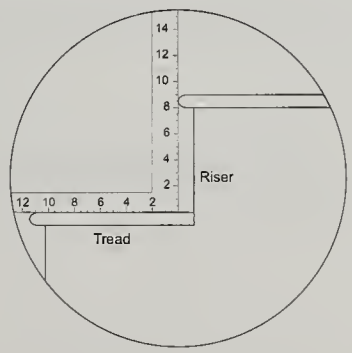
B. $\frac{9}{100}$

✔ C. $\frac{18}{100}$

D. $\frac{90}{100}$

Reporting Category for Question 23: **Probability (p. 158)**

24. The diagram shows a carpenter's square that is used to measure riser height and tread length. A carpenter has been asked to replace a staircase with one that is less steep. The carpenter could



A. increase the riser height leaving the tread length the same.

✔ **B. increase the tread length leaving the riser height the same.**

C. increase the tread length and the riser height proportionally.

D. decrease the tread length and the riser height proportionally.

Reporting Category for Question 24: **Geometry and Spatial Sense (p. 157)**

25. If the area of a rectangle is $8x^2 - 12x$, the dimensions of the rectangle could be

A. $2x$ and $(x - 3)$.

B. $4x$ and x.

✔ C. $4x$ and $(2x - 3)$.

D. $4x$ and $(x - 3)$.

Reporting Category for Question 25: **Algebra (p. 156)**

26. The sophomore class is sponsoring a dance for students in the ninth through twelfth grades. The price for the tickets sold in advance is \$5.00 and the price for the tickets sold at the door is \$6.00. The ticket sales are shown in matrix S.

$$S = \begin{array}{c} \begin{matrix} \text{Advance Sales} & \text{Door Sales} \end{matrix} \\ \begin{bmatrix} 10 & 15 \\ 27 & 31 \\ 42 & 12 \\ 16 & 27 \end{bmatrix} \end{array} \begin{matrix} \\ \text{9th} \\ \text{10th} \\ \text{11th} \\ \text{12th} \end{matrix}$$

Which price matrix can be used with the sales matrix to find a matrix showing the amount of money students in each class paid to attend the dance?

A. $\begin{bmatrix} \$5.00 & \$6.00 \end{bmatrix}$

✔ B. $\begin{bmatrix} \$5.00 \\ \$6.00 \end{bmatrix}$

C. $\begin{bmatrix} \$6.00 & \$5.00 \end{bmatrix}$

D. $\begin{bmatrix} \$6.00 \\ \$5.00 \end{bmatrix}$

Reporting Category for Question 26: **Discrete Mathematics (p. 155)**

27. The ratio of the volume of a square pyramid with the dimension of the base y units on a side and $3y$ units high, compared to the volume of a square prism y units on a side and $\frac{y}{3}$ units high

✔ A. is greater than one.

B. is equal to one.

C. is less than one.

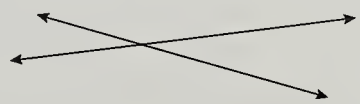
D. cannot be determined.

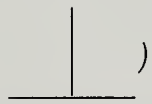
Reporting Category for Question 27: **Geometry and Spatial Sense (p. 157)**

Short-answer Questions, Session 1

28. A statement is made that two lines that intersect to form at least two congruent angles are perpendicular lines. Draw a sketch that shows that the above statement is **not** always true.

Correct Answer: two lines meeting, such as



(not  *)*

Reporting Category for Question 28: **Geometry and Spatial Sense (p. 157)**

Number of sides of a polygon	3	4	5	6	—	15
Sum of interior angles	180°	360°	540°	720°	—	?

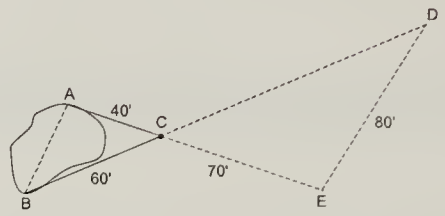
29. What is the sum of the interior angles of a 15-sided polygon?

Correct Answer: 2,340°

Reporting Category for Question 29: **Functions (p. 156)**

Short-answer Questions, Session 2

30. Jayne is surveying a piece of property. She needs to measure the distance across the pond from point A to point B. She places a stake in the ground at point C. Then Jayne locates points D and E so that ΔABC ~ ΔEDC. She measures $\overline{BC}$, $\overline{AC}$, $\overline{CE}$, and $\overline{DE}$ as shown in the diagram. Based on the data she has collected, what is the distance from A to B?



Correct Answers: 45.7 feet or
in a range of 45 to 46 feet

Reporting Category for Question 30: **Geometry and Spatial Sense (p. 157)**

31. In Ms. Amud's math class, the final class grades showed the following statistics:
    - mean = 85
    - median = 85
    - range = 20

    If nine students were in the class, list a possible set of scores.

Correct Answers: a set of 9 numbers with a range of 20, mean of 85, and median of 85, e.g., 75, 75, 75, 80, 85, 90, 95, 95, 95

Reporting Category for Question 31: **Statistics (p. 158)**

AUTOMOBILE STOPPING DISTANCE

Speed (mph)	10	20	30	40	50	60	70	80
Stopping Distance (feet)	15	40	75	120	175	240	315	

32. A driver training class collected the above information. Estimate the stopping distance if a car is traveling at 75 mph.

Correct Answer: an answer in the range of 356 to 358

Reporting Category for Question 32: **Estimation (p. 156)**

Open-response Questions, Session 2

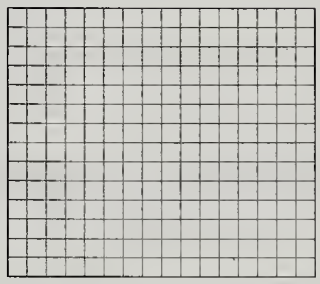
33. The table below represents the United States population (in millions) from 1986–1991.

    a. On the grid in your Student Answer Booklet *[example shown below]*, plot the data using the year as the horizontal *(x)* axis.

    b. Draw a single straight line that best represents the data.

    c. Explain why you drew your line as you did.

Year	U.S. Population in Millions
1986	239
1987	241
1988	243
1989	246
1990	248
1991	251



Reporting Category for Question 34: **Statistics (p. 158)**

34. Students in a 10th-grade math class have arranged the natural numbers in a spreadsheet. Maria's group starts by arranging the numbers in the table below.

    a. What numbers are in the 7th row?

    b. What numbers are in the 50th row? Explain how you determined this.

    c. Maria suggests that if she selects any number from column A and multiplies it by any number in column C, she can find the answer somewhere in column C. Is Maria correct? Explain your reasoning.

	A	B	C
1	1	2	3
2	4	5	6
3	7	8	9
4	10	11	12
5	13	–	–

Reporting Category for Question 35: **Discrete Mathematics (p. 155)**

35. The minimum wage increased from $5.25 to $5.75 per hour.

    a. What is the rate of increase of the minimum wage?

    b. Kevin was earning $6.35 per hour at the time of the minimum wage increase. His employer raised his salary to $7.10 per hour. Did his boss give him an increase comparable to the rate of increase given to the minimum wage earners? Explain your reasoning.

    c. Allana, who also works for the same employer, was promised a raise. If she is making $7.40 per hour, what new hourly wage would reflect an increase comparable to that received by the minimum wage earners? Show how you arrived at her new hourly wage.

Reporting Category for Question 36: **Mathematical Structure (p. 155)**

Open-response Questions, Session 3

36. a. What is the area of waste (shaded area) after cutting the largest possible circular area from a 28" square of sheet metal as shown in Figure 1? Show your work.

    b. What is the area of waste (shaded area) after cutting the four largest possible circular areas from a 28" square of sheet metal as shown in Figure 2? Show your work.

    c. What general expression can you use to find the amount of waste when cutting n^2 circles of equal size from a square piece of sheet metal measuring 28" on a side?

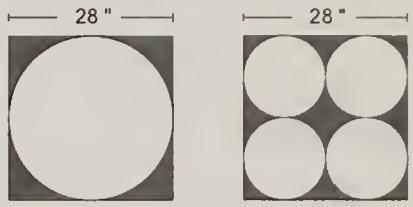
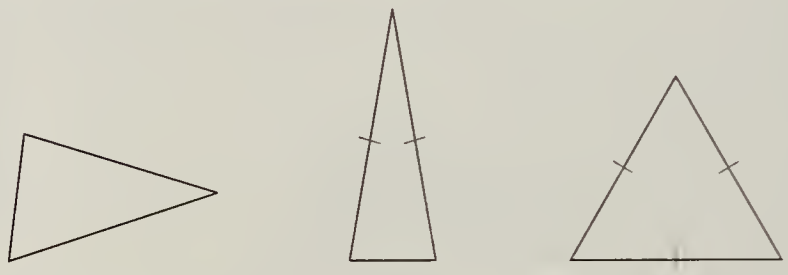


Figure 1 Figure 2

Reporting Category for Question 37: **Geometry and Spatial Sense (p. 157)**



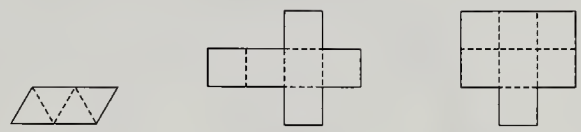
Triangle 1 Triangle 2 Triangle 3

37. a. In your Student Answer Booklet, draw all of the possible lines of symmetry in each of the three triangles above.

    b. Write an **if–then** statement for each triangle above showing the relationship between the sides and the lines of symmetry.

Reporting Category for Question 38: **Geometry and Spatial Sense (p. 157)**

Open-response Questions, Session 4



Pattern 1 Pattern 2 Pattern 3

38. a. Using the patterns above, describe or draw the closed 3-dimensional figure that will be formed by folding the patterns on the dashed lines. If it is not possible to make a closed 3-dimensional figure, state the reason(s) why.
    b. Make a pattern for a different closed 3-dimensional figure. Name and draw the geometric shape.

Reporting Category for Question 39: **Geometry and Spatial Sense (p. 157)**

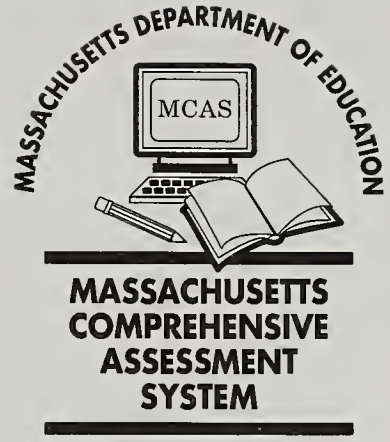
39. To make a house handicapped accessible, a ramp is being constructed to the floor of a porch. The Americans with Disabilities Act requires that a ramp have an incline of no more than 5°. Assume that the maximum allowable angle is used and that the floor of the porch to which the ramp is constructed is 4 feet above ground. (You may refer to the trigonometric table on your Mathematics Reference Sheet *[see Appendix A]*.)

    a. Draw and label a picture showing the ramp and the porch.

    b. Based on the information above, how far is the end of the ramp from the porch? Show your work.

    c. Based on the information above, what is the length of the ramp? Show your work.

Reporting Category for Question 40: **Trigonometry (p. 156)**



VIII. Science & Technology Grade 4

Massachusetts Department of Education

Curriculum Framework *Learning Standards/ MCAS Reporting Categories*

Science & Technology, Grade 4

The learning standards in this section are quoted directly from the Massachusetts *Science & Technology Curriculum Framework.*[1] The *Framework* defines four content strands, with three major divisions within the *Domains of Science* strand:

- *Inquiry*
- *Domains of Science*
  - *Physical Sciences*
  - *Life Sciences*
  - *Earth and Space Sciences*
- *Technology*
- *Science, Technology, and Human Affairs*

For reporting purposes, the *MCAS Science & Technology Guide*[2] divided each strand (except for *Science, Technology, and Human Affairs*) into multiple MCAS reporting categories for each grade. Learning standards are grouped below under the MCAS reporting category headings.[3] Applicable *Framework* page numbers are given in brackets following each heading.

Each common item in the second section of this chapter is followed by a reference to the reporting category that contains the learning standard(s) to which the item is related.

Inquiry

Classification (*Framework* p. 27)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- observe and describe familiar objects and events, identifying details, similarities, and differences.

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[1] Massachusetts Department of Education, *Science & Technology Curriculum Framework: Owning the Questions Through Science & Technology* (Malden, 1996).

[2] Massachusetts Department of Education, *Guide to the Massachusetts Comprehensive Assessment System: Science & Technology* (Malden, 1998).

[3] A very small percentage—less than 1%—of *Science & Technology Curriculum Framework* learning standards that are impractical to test in a large-scale assessment are not tested by MCAS (e.g., at grade 10: "use a range of exploratory techniques, e.g., experiments, information/literature searches, data logging, research and development"). These learning standards are not included in this document.

Designing an Investigation (*Framework* p. 27)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- ask questions, both investigable and non-investigable, about the objects and events observed. Suggest ideas about, "how," "why," and "what would happen if?"
- make predictions based on past experience with a particular material or object.
- plan and conduct a simple investigation knowing what is to be compared or looked for.

Data Collection, Measurement, and Display (*Framework* p. 27)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- extend observations using simple tools, e.g., hand lens, rulers, two-arm balance.
- describe and communicate observations through discussions, drawings, simple graphs, and writing.

Analysis and Interpretation of Data (*Framework* p. 27)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- recognize and communicate simple patterns in data.
- describe ideas about "how," "why," and "what would happen if?"
- interpret findings by relating one factor to another, e.g., If a ball is dropped from a higher place, will it always bounce higher?

Domains of Science: Physical Sciences

Properties of Matter (*Framework* p. 44)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- identify the observable properties of objects such as size, weight, shape, and color.
- give evidence that objects are made up of different materials. Show that properties are useful in describing, grouping, and classifying materials.

- represent an understanding that materials can exist in different states, including solid, liquid, and gaseous, and identify different characteristic properties of materials in each state.

- show and describe how change in a material may be either physical, such as changes in state or appearance, or chemical, such as changes in composition.

Position and Motion of Objects (*Framework* p. 44)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- describe the motion of an object in terms of change in position relative to another object or the background.

- experience and describe how an object's motion can be changed through the action of a push or pull on the object.

- demonstrate that sound is produced by vibrating objects.

Energy (*Framework* p. 44)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- represent an understanding that the sun supplies heat and light to the Earth.

- manipulate a variety of objects in a beam of light in order to explore conditions in which different objects cast shadows, bend, or transmit light.

- demonstrate that things that give off light may also give off heat.

- investigate situations in which changes in matter also give off energy as light, heat, or sound.

- use qualitative or quantitative measurement to investigate the concept that warmer things put with cooler ones lose heat and the cool ones gain heat, until they are all at the same temperature.

- explore and describe how heat travels more quickly through some materials than others.

- provide evidence that a magnet pulls on all things made of iron and either pushes or pulls on other magnets.

- demonstrate how materials that have been electrically charged may either push or pull other charged materials.

- investigate and describe how light, sound, heat, and sparks can be produced in electrical circuits using batteries as an energy source.

Domains of Science: Life Sciences

Characteristics of Organisms (*Framework* p. 59)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- explore and describe that plants and animals are living things and have characteristics that differentiate them from non-living things.
- demonstrate an understanding that plants and animals go through predictable life cycles. These differ from species to species, but all include growth, development, reproduction, and death.
- observe and describe that plants and animals have different structures that serve different functions in growth, survival, and reproduction. These contribute to the well-being of the whole organism, and to the success of its offspring.
- demonstrate awareness that there are millions of kinds of living things on Earth, and that the number of species is not known.

Adaptations, Diversity, and Heredity (*Framework* pp. 59–60)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- give examples of how different plants and animals have features that help them thrive in different kinds of places. Recognize that these features may be external or internal (such as warm- or cold-bloodedness), or behavioral.
- identify some kinds of organisms that once lived on earth and that have completely disappeared.
- observe and illustrate ways that individuals of the same kind differ in some of their characteristics, and that sometimes the differences give individuals an advantage in surviving and reproducing.
- compare fossils to one another and to living organisms according to their similarities and differences.
- provide examples of variations as well as similarities among individuals of the same species. Recognize that although it is hard for us to see this, it is true of all kinds of organisms.
- observe and describe that some of the variations within a species are acquired during the individual's lifetime (such as an athlete's muscles, or the ability to play the piano); some were inherited from the individual's parents (such as eye color); some start with inherited tendencies, which develop in individual ways owing to the conditions of the individual's life (such as height and foot-size).

- identify ways that offspring resemble their parents, but are not identical to them. Realize that, in every group of organisms, there is variation in every characteristic.

Organisms and Environments (*Framework* p. 60)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- provide evidence that all organisms use some basic chemical building blocks, including water and oxygen. Observe that each kind of organism has special living requirements, and each has its own way to get the energy and nutrients it needs. Observe that green plants can make their own food from sunlight; animals consume plants or other organisms for their food.

- explore and illustrate an understanding that decomposers, which include single-celled organisms and fungi, break down dead plants and animals for food.

- provide examples of living organisms meeting their needs by interacting with living and non-living parts of the environment in which they live.

- observe and demonstrate ways that all organisms effect change in the environment where they live. Recognize that some of these changes are detrimental to themselves and other organisms, whereas others are beneficial. Observe ways that changes in environmental factors, such as humidity, temperature, and light, also affect the organisms in an environment.

Domains of Science: Earth and Space Sciences

Properties of Earth's Materials (*Framework* p. 74)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- illustrate that Earth's surface is composed of water, rocks, soils, and living organisms.

- observe and describe that change is something that happens to Earth materials.

- illustrate that some events in nature have a repeating pattern. The weather changes some from day to day, but things such as temperature and precipitation show annual rhythms particular to a geographical area.

- observe and show that air has properties that can be identified and measured, such as wind speed and direction, temperature, moisture, the occurrence of clouds, and the fall of precipitation. Know that together these properties and events for a particular place and time is called the weather.

- explore and demonstrate that rocks are made of minerals.

(continued on next page)

- observe and illustrate that rocks come in many sizes and shapes, from boulders to grains of sand and even smaller.

- show evidence that water flows downhill in streams and rivers, or accumulates in lakes and puddles and seeps into the ground.

- examine and describe ways in which fossils provide evidence of Earth's history, and show how plants, animals, and environments have changed over time.

- illustrate that the interior of Earth is hot. Heat flow and movement of material within the Earth move continents, cause earthquakes and volcanic eruptions, and create mountains and ocean basins.

Objects in the Sky (*Framework* p. 75)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- examine and illustrate that Earth is one of several planets that orbit the sun, and that the moon orbits around the Earth.

- describe ways in which the sun, moon, planets, meteors, clouds and other objects in the sky can be identified by properties such as size, shape, color, brightness, and movement.

- represent understanding that the sun provides light and heat.

- observe and explain why the sun can be seen only in the daytime, but the moon can be seen sometimes at night and sometimes during the day. Know that because Earth rotates, the sun, moon, and stars all appear to move slowly across the sky.

- observe and illustrate why the moon looks a little different every day, but looks the same again about every four weeks.

Technology

The Design Process (*Framework* p. 88)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- identify a simple current technological problem.

- implement a solution by constructing a device using materials provided.

- evaluate a solution in terms of whether it meets the goals.

- communicate a problem, design, or solution using drawings and words.

- propose ways to improve the solution.

Understanding and Using Technology (*Framework* pp. 90–91)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- describe ways in which tools and machines are used to process materials, energy, and information.
- demonstrate use and care of simple tools.
- document that people are always inventing new ways to get things done.
- use a variety of materials such as wood, metal, plastic, fabric, and clay to make simple products.
- identify materials that can be recycled and those that cannot.
- explain that messages are communicated using tools such as pencils and computers.
- observe and model many types of structures, e.g., residences, skyscrapers, bridges, tunnels, airports.
- describe and experience how objects can be made from materials such as wood, plastic, paper, metal, and clay by processes often involving machines.
- describe how people and goods are transported using boats, automobiles, trucks, airplanes, and space vehicles.
- describe differences between natural objects and objects made by people.
- identify daily activities that involve the use of technology, e.g., communication, transportation.
- describe ways in which technological tools and methods allow us to better learn about the laws of nature.
- document how technological inventions and innovations have been developed by women and men from various racial and cultural backgrounds, including individuals from Massachusetts.
- examine evidence that where people live, and how they communicate, and how they travel reflect technological changes.

Science, Technology, and Human Affairs

Science, Technology, and Human Affairs (*Framework* pp. 90 and 110)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- describe how technologies may have positive and negative impacts on people and the environment.[4]
- give examples to show that many of today's technologies were not part of the world of their parents or grandparents.
- describe some ways in which science and technology have changed the way people do their work and live their lives.
- give examples to show that the decisions we make as individuals have effects on other people.
- explore and describe how science and technology have also created problems we need to solve.
- give examples to show that we (as individuals, groups, and communities) can make decisions that change the natural environment.

[4] This learning standard derives from the *Technology* strand of the *Framework*.

MCAS May 1998 Common Test Items

Science & Technology, Grade 4

Number of Sessions

Grade 4 MCAS Student Test Booklets included 3 separate Science & Technology test sessions. Each session included multiple-choice and open-response questions.

Formatting in this Document

In this document, all common multiple-choice questions are shown first, followed by common open-response questions. The test session in which each group of questions appeared is identified before the first question from that session.

Materials are not formatted exactly as they appeared in Student Test Booklets. For instance, in order to present items most efficiently in this document, the following modifications have been made:

- Some fonts and/or font sizes have been changed and/or reduced.
- Some graphics which appeared above questions in Student Test Booklets are shown instead to the side.
- Most graphics have been reduced in actual size from but maintain the same proportions as those that appear in Student Test Booklets.

Correct Answers

Correct answers for **multiple-choice questions** are shown in **bold** and indicated by a check mark.

An overview of procedures for scoring responses to MCAS **open-response questions** and **writing prompts** can be found in the MCAS fact sheet, "Facts on Scoring of Student Answers to Open-Response Questions and Writing Prompts," which is available on the Department's Internet site at **www.doe.mass.edu.** Scoring procedures are also explained further in the MCAS document, *Guide to Interpreting the 1998 MCAS School and District Reports,* which is due for release in late fall 1998.

Multiple-choice Questions, Session 1

Suppose it is March 5. A friend of yours is going on a trip to Chicago on March 8. The maps show the weather predictions for March 6, 7, and 8.

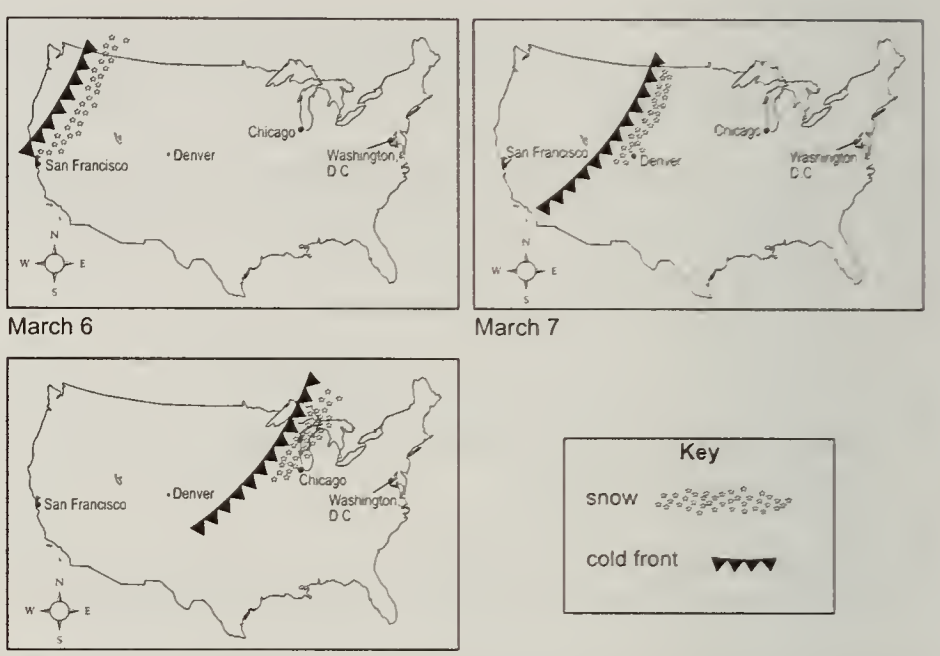
1. In which direction is the cold front moving?

   A. north

   B. south

   ✔ C. east

   D. west



Reporting Category for Question 1: **Properties of Earth's Materials (pp. 183-184)**[5]

2. The term "solid" should be put in the chart in

   ✔ A. place W.

   B. place X.

   C. place Y.

   D. place Z.

STATE OF MATTER	DESCRIPTION	EXAMPLE
W	has definite shape and size	Building block
Liquid	has definite size but no shape	Y
X	has no definite size or shape	Z

Reporting Category for Question 2: **Classification (p. 179)**

[5] Results from question 1 were not included in scores for students who took the Spanish-language version of MCAS.

3. Which of the following is a trait that a dog does NOT inherit from its parents?

   A. the length of its fur

   B. the shape of its nose

   ✔ C. the size of its appetite

   D. the color of its fur

Reporting Category for Question 3: **Adaptations, Diversity, and Heredity (pp. 182-183)**

4. People are developing electric cars that would replace gasoline-burning cars. One major advantage of the electric car is that it

   A. accelerates faster.

   ✔ B. causes less pollution.

   C. gives a smoother ride.

   D. needs no battery.

Reporting Category for Question 4: **The Design Process (p. 184)**

5. Which picture correctly shows where the shadow would be?

   A.

   B.

   ✔ C.

   D.

Reporting Category for Question 5: **Energy (p. 181)**

6. Which of the following tools would best help you learn more about the objects in the box?

grass
leaves
sugar
salt
piece of wood
flour

✔ A.

B.

C.

D.

Reporting Category for Question 6: **Data Collection, Measurement, and Display (p. 180)**

7. What is the cause of most earthquakes?

A. the rotation of Earth

B. the direction of the wind

C. the pull of Earth's gravity

✔ **D. the movement of plates on Earth's crust**

Reporting Category for Question 7: **Properties of Earth's Materials (pp. 183-184)**

8. Where would it be MOST dangerous to work with electric tools?

A. in a garage

✔ **B. beside a swimming pool**

C. near a television or computer

D. in a cool basement

Reporting Category for Question 8: **Understanding and Using Technology (p. 185)**

9. For his science project, Alan began a study of sugar maple trees. He noticed many differences among the sugar maple trees near his school. Which of the following tree characteristics would vary the LEAST?

   A. height

   B. number of leaves

   ✔ C. type of seeds

   D. trunk width

Reporting Category for Question 9: **Characteristics of Organisms (p. 182)**

When students from the local school helped clean the city park, they found a lot of litter floating on top of the pond. They wondered if more litter had sunk to the bottom of the pond. Back in the classroom, they conducted an experiment to see how long litter objects would float. They ran three trials; the averages are recorded in the chart below.

Object	Average Floating Time In Seconds					
	0–4	5–9	10–14	15–19	20–24	More than 24
Plastic bottle cap						X
Flat piece of foil, 2" × 3"				X		
Cloth rag, 12" × 12"		X				
Peach pit	X					
Plastic sandwich bag (open)					X	

10. Which of the following correctly lists the piece of foil, the cloth rag, and the plastic bag in order from SHORTEST average floating time to LONGEST average floating time?

   A. bag → cloth rag → foil

   ✔ B. cloth rag → foil → bag

   C. foil → bag → cloth rag

   D. cloth rag → bag → foil

Reporting Category for Question 10: **Analysis and Interpretation of Data (p. 180)**

11. A dish of sugar water was left on a window sill. One week later, there were only sugar crystals left in the dish. The water was gone. The best explanation for the appearance of sugar crystals is

   A. some of the water was absorbed by the dish.

   B. the air condensed.

   C. the light shining on the window sill produced more sugar.

   ✔ D. the water evaporated.

Reporting Category for Question 11: **Properties of Matter (pp. 180-181)**

12. Soil is a mixture of many substances which may include

A. sun, water, clay, and sand.

B. sand, clay, wind, and pebbles.

✔ **C. sand, clay, dead plants, and dead animals.**

D. leaves, twigs, sun, and wind.

Reporting Category for Question 12: **Properties of Earth's Materials (pp. 183-184)**

13. Some factories release pollutants into the air that form acid rain. What determines where the acid rain is most likely to fall?

A. ocean currents

✔ **B. wind direction**

C. air temperature

D. relative humidity

Reporting Category for Question 13: **Science, Technology, and Human Affairs (p. 186)**

Multiple-choice Questions, Session 2

14. The Beaufort Scale is used to classify the strength of the wind. In the scale below, some of the wind's effects are missing. Which of the following describes the effect of a GENTLE BREEZE?

Beaufort Number	Wind Speed (miles per hour)	Description of Wind	Wind's Effect
0	less than 1	calm	?
1	1 to 3	light air	chimney smoke drifts
2	4 to 7	light breeze	leaves rustle
3	8 to 12	gentle breeze	?
4	13 to 18	moderate breeze	dust and loose paper are blown about
5	19 to 24	fresh breeze	white caps and spray appear on the ocean
6	25 to 31	strong breeze	large branches move
7	32 to 38	moderate gale	hard to walk against the wind
8	39 to 46	gale	?
9	47 to 54	strong gale	ocean waves are high—roof slates may blow off
10	55 to 63	whole gale	trees are uprooted
11	64 to 75	storm	?

A. Chimney smoke moves straight upwards.

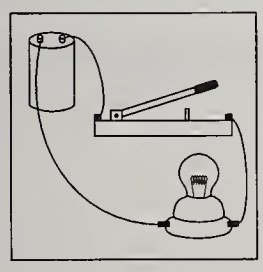
B. Buildings are damaged.

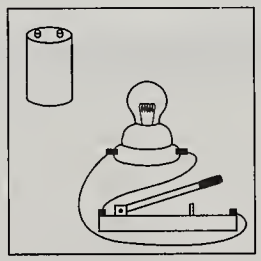
✔ C. **Flags wave slightly on a flagpole.**

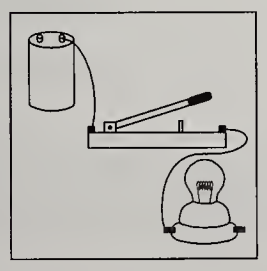
D. Tree branches snap off.

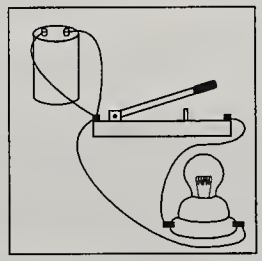
Reporting Category for Question 14: **Analysis and Interpretation of Data (p. 180)**

15. In science and technology class, Lee is learning to light a bulb using a switch, a battery, and some wire. She wants to show her parents how it can be done. When she closes the switch, which bulb will light?

✔ A. 

C. 

B. 

D. 

Reporting Category for Question 15: **Energy (p. 181)**

16. The telephone was invented in Boston by

✔ **A. Alexander Graham Bell.**

B. Samuel F. B. Morse.

C. Henry Ford.

D. Thomas Alva Edison.

Reporting Category for Question 16: **Science, Technology, and Human Affairs (p. 186)**

17. Which is the correct order of the metamorphosis of a butterfly?

✔ **A. egg, larva, pupa, adult**

B. egg, pupa, larva, adult

C. egg, adult, larva, pupa

D. egg, larva, adult, pupa

Reporting Category for Question 17: **Characteristics of Organisms (p. 182)**

18. Which of the following helps the leaves break down after they have fallen off the tree?

A. meat-eaters

B. rocks

✔ **C. decomposers**

D. cold temperatures

Reporting Category for Question 18: **Organisms and Environments (p. 183)**

19. Planets orbit

A. Earth.

B. the Moon.

C. the galaxy.

✔ **D. the Sun.**

Reporting Category for Question 19: **Objects in the Sky (p. 184)**

Multiple-choice Questions, Session 3

Yolanda dropped a ball from a height of one foot above the ground. She measured how high it bounced and recorded this data in the chart below. She then dropped the ball from other heights, measured how high the ball bounced, and recorded the data in the chart. The chart contains all of the data that Yolanda collected.

20. Based on the data in the chart, predict how high the ball will bounce when Yolanda drops it from a height of 5 feet.

Height of the ball when it is dropped	Height the ball bounces
1 foot	4 inches
2 feet	9 inches
3 feet	15 inches
4 feet	21 inches
5 feet	?

A. The ball will bounce about 19 inches high.

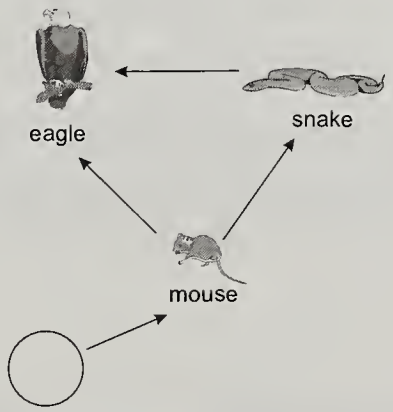
✔ **B. The ball will bounce about 27 inches high.**

C. The ball will bounce about 33 inches high.

D. The ball will bounce about 39 inches high.

Reporting Category for Question 20: **Analysis and Interpretation of Data (p. 180)**

21. What organism most likely belongs in the circle?



✔ **A. plant**

B. frog

C. rabbit

D. hawk

Reporting Category for Question 21: **Organisms and Environments (p. 183)**

22. Bridge inspectors have determined that a bridge is unsafe. Which of the following is the BEST design process the company should use to correct the problem?

A. identify the problem—repair the bridge—plan for the repair

B. plan for the repair—repair the bridge—identify the problem

C. plan for the repair—identify the problem—repair the bridge

✔ **D. identify the problem—plan for the repair—repair the bridge**

Reporting Category for Question 22: **The Design Process (p. 184)**

23. Melinda looked out of her window one night and saw a very bright star just over the top of a tree. Late that night she looked out and the star was gone. Which BEST explains what happened?

✔ A. Earth turns so the stars seem to move.

B. Some stars only shine for a few hours each night.

C. The star must have burned up.

D. Some stars move faster than others.

Reporting Category for Question 23: **Objects in the Sky (p. 184)**

24. Years ago, most family members lived near one another. Today, family members often live all over the country. People are able to live far from their loved ones because of the technologies of

A. medicine and computers.

B. manufacturing and home entertainment.

C. refrigeration and heating systems.

✔ D. communication and transportation.

Reporting Category for Question 24: **Understanding and Using Technology (p. 185)**

25. At 10 A.M. the Sun is shining on a puddle of water on the road. At 2 P.M. the Sun is still shining and the puddle has disappeared. What happened to the water?

A. It rained.

B. It condensed.

✔ C. It evaporated.

D. It froze.

Reporting Category for Question 25: **Properties of Earth's Materials (pp. 183-184)**

26. The drawing shows a string instrument with strings of three different diameters. Which statement is true?

A. Strings X and Y will vibrate at the same speed.

✔ B. String X will vibrate the fastest and produce the highest sound.

C. String X will vibrate the slowest and produce the lowest sound.

D. Strings Y and Z will produce the same sound.

Reporting Category for Question 26: **Position and Motion of Objects (p. 181)**

Open-response Questions, Session 1

27. Each of the objects above can be placed into one of two groups: objects attracted by a magnet OR objects not attracted by a magnet. Complete the chart on page 21 in your Student Answer Booklet to show the two groups and list each object in one of the two groups. ALL OBJECTS MUST BE LISTED.

Reporting Category for Question 27: **Classification (p. 179)**

28. Joey saw an advertisement that said that a product called "Super Grow" will help a plant grow taller. DESIGN an experiment that he can do to see if "Super Grow" really does make his tomato plants grow taller.

    a. DESCRIBE the steps he will take in this experiment.

    b. DRAW a chart that he could use to record his observations.

    c. What would he look for in his completed chart that would tell him whether "Super Grow" helps tomato plants to grow taller?

Reporting Category for Question 28: **Designing an Investigation (p. 180)**

Open-response Questions, Session 2

29. The water in a pond is part of the water cycle.

    a. Draw a diagram of the water cycle.

    b. Label each part of the water cycle.

    c. Explain what happens during EACH part of the water cycle.

Reporting Category for Question 29: **Properties of Earth's Materials (pp. 183-184)**

30. Three hundred years ago people did not have the items listed below.

TELEPHONE AIRPLANE ELECTRIC LIGHT BULB

a. DESCRIBE at least one way the telephone changed people's lives.

b. DESCRIBE at least one way the airplane changed people's lives.

c. DESCRIBE at least one way the electric light bulb changed people's lives.

Reporting Category for Question 30: **Science, Technology, and Human Affairs (p. 186)**

Open-response Questions, Session 3

31. Pretend you are a botanist (a person who studies plants). You are to write an encyclopedia entry for a plant. CHOOSE a plant. Then do the following.

    a. DRAW and LABEL your plant to show THREE parts. Make sure you identify your plant.

    b. DESCRIBE the function of each part you show in your drawing and TELL how each part helps the plant live in its natural habitat.

Reporting Category for Question 31: **Characteristics of Organisms (p. 182)**

32. You are going to build a storage case for an object of your choice. You may build it out of any suitable materials.

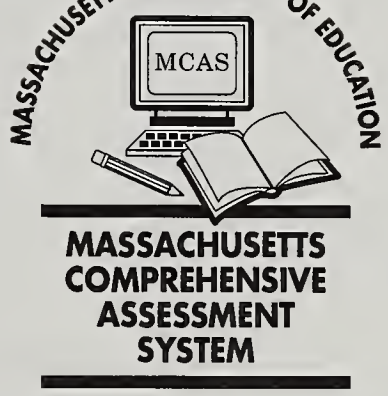
    a. IDENTIFY what will be stored in the case.

    b. DESIGN, draw, and label a plan for the storage case.

    c. LIST the materials and tools that you will need to build the storage case.

    d. DESCRIBE the steps you will use to build the storage case.

Reporting Category for Question 32: **The Design Process (p. 184)**



IX. Science & Technology
Grade 8

Massachusetts Department of Education

THE BRANNER LIBRARY

Curriculum Framework *Learning Standards/ MCAS Reporting Categories*

Science & Technology, Grade 8

The learning standards in this section are quoted directly from the Massachusetts *Science & Technology Curriculum Framework*.[1] The *Framework* defines four content strands, with three major divisions within the *Domains of Science* strand:

- *Inquiry*
- *Domains of Science*
  - *Physical Sciences*
  - *Life Sciences*
  - *Earth and Space Sciences*
- *Technology*
- *Science, Technology, and Human Affairs*

For reporting purposes, the *MCAS Science & Technology Guide*[2] divided each strand (except for *Science, Technology, and Human Affairs*) into multiple MCAS reporting categories for each grade. Learning standards are grouped below under the MCAS reporting category headings.[3] Applicable *Framework* page numbers are given in brackets following each heading.

Each common item in the second section of this chapter is followed by a reference to the reporting category that contains the learning standard(s) to which the item is related.

Inquiry

Designing an Investigation (*Framework* p. 28)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- note and describe relevant details, patterns, and relationships.
- differentiate between questions that can be answered through direct investigation and those that cannot.
- apply personal experience and knowledge to make predictions.
- apply multiple lines of inquiry to address and analyze a question, e.g., experimentation, trial and error, survey, interview, and secondary sources.

(continued on next page)

[1] Massachusetts Department of Education, *Science & Technology Curriculum Framework: Owning the Questions Through Science & Technology* (Malden, 1996).

[2] Massachusetts Department of Education, *Guide to the Massachusetts Comprehensive Assessment System: Science & Technology* (Malden, 1998).

[3] A very small percentage—less than 1%—of *Science & Technology Curriculum Framework* learning standards that are impractical to test in a large-scale assessment are not tested by MCAS (e.g., at grade 10: "use a range of exploratory techniques, e.g., experiments, information/literature searches, data logging, research and development"). These learning standards are not included in this document.

- design an investigation or problem specifying variables to be changed, controlled, and measured.
- analyze alternative explanations and procedures.
- communicate ideas and questions generated, and suggest improvements or alternatives to the experimental techniques used.

Data Collection, Measurement, and Display (*Framework* p. 28)[4]

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- use more complex tools to make observations, and gather and represent quantitative data, e.g., microscopes, graduated cylinders, computer probes, stress and impact testers, wind tunnels, and timers.
- represent data and findings using tables, models, demonstrations and graphs.

Analysis and Interpretation of Data (*Framework* p. 28)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- describe trends in data even when patterns are not exact.
- reformulate ideas and technological solutions based on evidence.[5]
- communicate the idea that usually there is more than one solution to a technological problem.[6]
- design a solution involving a technological problem and describe its advantages and disadvantages.[7]

Domains of Science: Physical Sciences

Properties of Matter (*Framework* p. 47)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- identify properties that allow materials to be distinguished from one another and often make them well suited to specific purposes.
- identify and classify elements and compounds with similar properties, such as metals, metalloids, and non-metals; acids and bases; combustibles and non-combustibles.

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[4] The learning standards associated with the grade 8 Science & Technology reporting category, *Data Collection, Measurement, and Display,* were not tested in the 1998 administration of MCAS, but will be tested in 1999 and future years.

[5] Related learning standards can be found in the grade 8 reporting category, *The Design Process.*

[6] See note 5.

[7] See note 5.

- present evidence that a chemical change involves the transformation of one or more substances into new substances with different characteristic properties.
- explore and describe that the mass of a closed system is conserved.
- measure and predict changes in the pressure, temperature, or volume of a gas sample when changes occur in either of the other two properties.
- describe a particulate model for matter that accounts for the observed properties of substances.
- recognize and explain how experimental evidence supports the idea that matter can be viewed as composed of very small particles (such as atoms, molecules and ions) that are in constant motion. Illustrate understanding that particles in solids are close together and not moved about easily; particles in liquids are about as close together and move about more easily; and particles in gases are quite far apart and move about freely.
- provide evidence that shows how the conservation of mass is consistent with the particulate model that describes changes in substances as the result of the rearrangement of the component particles.

Motion (*Framework* p. 48)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- show and describe how forces acting on objects as pushes or pulls can either reinforce or oppose each other.
- demonstrate that all forces have magnitude and direction; create situations to model how forces acting in the same direction reinforce each other and forces acting in different directions may detract or cancel or nullify each other.
- describe and represent an object's motion graphically in terms of direction, speed, velocity, and/or position versus time; describe these quantities verbally and mathematically.

Energy (*Framework* p. 48)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- represent an understanding that energy cannot be created or destroyed but exists in different interchangeable forms, such as light, heat, chemical, electrical, and mechanical.
- present evidence that heat energy moves in predictable ways, flowing from warmer objects to cooler ones until both objects are at the same temperature.

(continued on next page)

- illustrate an understanding that energy comes to Earth as electromagnetic radiation in a range of wavelengths, such as light, infrared, ultraviolet, microwaves, and radio waves.

- investigate and describe an understanding of visible electromagnetic radiation, which we generally call light, with reference to qualities such as color and brightness. Illustrate understanding that light has direction associated with it, and can be absorbed, scattered, reflected, or transmitted by intervening matter.

- explain ways that energy can be changed from one form to another.

- demonstrate principles of electrical circuits.

Domains of Science: Life Sciences

Characteristics of Organisms (*Framework* p. 62)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- identify the cell as the basic unit of life and the smallest unit that can reproduce itself. Give examples of single and multicellular organisms.

- explore and describe an understanding that plants, animals, fungi, and various types of microorganisms are major categories of living organisms. Each category includes many different species. Note that these categories are subject to change. Life does not always fit into neat categories (e.g., are viruses alive?).

- observe and explain that in single cells there are common features that all cells have as well as differences that determine their function.

- investigate and illustrate evidence that cell replication results not only in the multiplication of individual cells, but also in the growth and repair of multicellular organisms.

- present data to illustrate that all organisms, whether single or multicellular, exhibit the same life processes, including growth, reproduction and the exchange of materials and energy with their environments.

- describe ways that cells can differ in multicellular organisms, assuming different appearances and carrying out specialized functions.

- investigate and explain that complex multicellular organisms are interacting systems of cells, tissues, and organs that fulfill life processes through mechanical, electrical, and chemical means, including procuring or manufacturing food, and breathing and respiration.

Diversity, Adaptation, and Reproduction of Organisms (*Framework* pp. 62–63)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- explain situations in which short-term changes in available food, moisture, or temperature of an ecosystem may result in a change in the number of organisms in a population or in the average size of individual organisms or in the behavior of individuals in a population.

- explore and illustrate that, in both the short and long term (millions of years), changes in the environment have resulted in qualitative and quantitative changes in the species of plants and animals that inhabit Earth.

- explain the importance of reproduction to the survival of the species.

- investigate and describe processes by which organisms that have two parents receive a full set of genetic instructions by way of the parents' reproduction cells specifying individual traits from each parent. Offspring exhibit traits from each parent.

- illustrate an understanding that sorting and recombining of the genetic material of parents during reproduction produce the potential for variation among offspring.

- examine evidence and describe that there are minor differences among individuals from the same population or among individuals of the same species.

Ecosystems and Organisms (*Framework* p. 63)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- present evidence that species depend on one another.

- explore and illustrate how energy is supplied to an ecosystem primarily in the form of sunlight.

- observe and illustrate the variety of ways in which plants, animals, fungi, and microorganisms interact.

- classify organisms according to the function they serve in a food chain (any single organism can serve each of these functions): production of food, consumption of food, or decomposition of organic matter.

Domains of Science: Earth and Space Sciences

Interactions and Cycles in the Earth System/Earth's History (*Framework* pp.76–77)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- demonstrate an understanding of the internal and external structure of planet Earth.
- explore and illustrate an understanding that heat flow and movement of material within Earth moves the continents, causes earthquakes and volcanic eruptions, and creates mountains and ocean bases.
- evaluate conditions under which sedimentary, igneous, and metamorphic rocks form.
- identify ways in which soil is formed by the weathering of rock and the decomposition of dead plants and animal debris.
- give evidence that water in the Earth system exists naturally in all three states and water continuously circulates through the Earth's crust, oceans and air (water cycle).
- demonstrate an understanding that, like all planets and stars, Earth is approximately spherical in shape. (also addressed in reporting category "Earth and Space")
- present evidence that Earth's oceans are a reservoir of nutrients, minerals, dissolved gases, and life forms which are the major source of water vapor for the atmosphere and that the store of heat transported by ocean currents greatly affect Earth's climate.
- observe and describe evidence that local climate changes over periods of years or decades, while global climate changes much more slowly.
- examine and demonstrate evidence that weather can be studied in terms of properties of the atmosphere such as pressure, temperature, humidity, wind speed and direction, precipitation, and amount and type of clouds.
- explain that clouds reflect much of the sunlight intercepted by Earth, while at the same time returning to Earth's surface a large fraction of the far infrared energy emitted from the surface.
- examine and demonstrate evidence that the atmosphere and the oceans have a limited capacity to recycle materials naturally.
- explore and describe that rain or snow falls and moves by gravity from higher to lower areas both on the surface and on the ground and that the natural flow region is called the watershed.

- investigate and illustrate ways in which human activities, such as reducing the amount of forest cover, increasing the amount and variety of chemicals released into the atmosphere, and intensive farming, have changed Earth's land, oceans, and atmosphere.

- examine evidence and illustrate that the movement of the continents have had significant effects on the distribution of living things.

- examine and describe ways in which rocks, fossils, ice cores, and tree rings record events of Earth's history, documenting plate movements, volcanic eruptions, cycles of erosion and deposition, and the evolution of life.

Earth and Space (*Framework* pp. 77–78)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- observe and demonstrate that the patterns of stars in the sky stay the same, although they appear to move across the sky nightly, and different stars can be seen in different seasons.

- explore and explain that telescopes magnify the appearance of some distant objects in the sky, including the moon and the planets.

- observe and illustrate that planets change their positions against the background of stars.

- recognize and describe that the Solar System contains the central sun, the known planets, their moons, and many asteroids, meteors, and comets that orbit the sun.

- demonstrate evidence that the sun is a medium-sized star located near the edge of a disk-shaped galaxy of stars, part of which can be seen as a glowing band of light that spans the sky on a very clear night.

- illustrate that the universe contains many billions of galaxies, and each galaxy contains many billions of stars.

- observe and explain that Earth has a natural satellite, the moon, that circles the planet approximately every 29 days.

- give evidence that gravity is a force that produces an attraction between matter. Gravity pulls on or anywhere near Earth toward the Earth's center and acts across space to hold the moon in its orbit around Earth and the planets in their orbits around the sun.

- illustrate that the Sun produces energy and is the major source of heat and light for Earth.

Technology

The Design Process (*Framework* p. 92)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- identify and work on their own problem or one developed by a peer.
- explore and illustrate possible solutions and, from these, propose one solution.
- make a plan for building a device considering the limitations of the material and including multiple views.
- evaluate designs, devices, or solutions and develop measures of quality.
- communicate the process of technological design.

Understanding and Using Technology (*Framework* pp. 94–95)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- use tools, materials, and machines safely and effectively.
- explain how the choice of materials depends upon their properties and characteristics and how they interact with other materials.
- use the results of material tests (i.e., hardness, tensile strength, conductivity) to suggest appropriate uses for materials.
- model the ways that multiple resources are used to develop new technologies. These include people, information, tools and machines, materials, energy, capital, and time.
- give examples that information can be communicated both graphically and electronically by a range of technological processes.
- explain how a manufacturing enterprise produces a product by converting raw materials into goods.
- identify the processes used in construction: site preparation, building, and finishing a structure.
- compare how transportation systems are devised to transport people and products on land, water, air, and in space.
- describe how power systems are used to convert and transmit mechanical, electrical, fluid, and heat energy. Describe limited (i.e., fossil fuels), unlimited (i.e., solar, gravitational) and renewable (i.e., biomass) energy sources.

- document ways that a range of tools and machines, such as measuring, hand, and optical tools, are used to implement solutions to design problems.
- explain how technological progress has been the result of cumulative work over many centuries by men and women from various cultures and races.
- describe ways that technological advances may be accompanied by negative side effects.
- explain how the evolution of technology led the change from an agricultural to an industrial to an information-based society.
- provide evidence that technology is growing at a faster rate today than ever before in history.
- describe ways in which innovations and inventions address human biological, physical, and psychological needs.

Science, Technology, and Human Affairs

Science, Technology, and Human Affairs (*Framework* pp. 94 and 110)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- describe situations in which science, technology, and society have influenced each other in the past.
- identify the influences that science and technology have on today's society.
- give examples that the decisions we make as individuals, groups, and communities can affect society and the natural environment and that these changes are not always easy to reverse.
- recognize and demonstrate that while technology can help us to manage societal and environmental problems, it can also have a negative impact on society and on the natural world.
- describe ways that technological devices have improved the quality of life for individuals.[8]

[8] This learning standard derives from the *Technology* strand of the *Framework*.

MCAS May 1998 Common Test Items

Science & Technology, Grade 8

Number of Sessions

Grade 8 MCAS Student Test Booklets included 3 separate Science & Technology test sessions. Each session included multiple-choice and open-response questions.

Formatting in this Document

In this document, all common multiple-choice questions are shown first, followed by common open-response questions. The test session in which each group of questions appeared is identified before the first question from that session.

Materials are not formatted exactly as they appeared in Student Test Booklets. For instance, in order to present items most efficiently in this document, the following modifications have been made:

- Some fonts and/or font sizes have been changed and/or reduced.
- Some graphics which appeared above questions in Student Test Booklets are shown instead to the side.
- Most graphics have been reduced in actual size from but maintain the same proportions as those that appear in Student Test Booklets.

Correct Answers

Correct answers for **multiple-choice questions** are shown in **bold** and indicated by a check mark.

An overview of procedures for scoring responses to MCAS open-response questions can be found in the MCAS fact sheet, "Facts on Scoring of Student Answers to Open-Response Questions and Writing Prompts," which is available on the Department's Internet site at **www.doe.mass.edu.** Scoring procedures are also explained further in the MCAS document, *Guide to Interpreting the 1998 MCAS School and District Reports,* which is due for release in late fall 1998.

Multiple-choice Questions, Session 1

Periodic Chart of the Elements

1 H 1.008																	2 He 4.003
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.90	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.70	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (97)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.4	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.90	54 Xe 131.30
55 Cs 132.91	56 Ba 137.33	57 *La 138.91	72 Hf 178.49	73 Ta 180.95	74 W 183.85	75 Re 186.21	76 Os 190.2	77 Ir 192.22	78 Pt 195.09	79 Au 196.97	80 Hg 200.59	81 Tl 204.37	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226.03	89 **Ac (227)	104 Unq (261)	105 Unp (262)	106 Unh (263)	107 Uns (262)											

*Lanthanide Series

58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (147)	62 Sm 150.4	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97

**Actinide Series

90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np 237.05	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (254)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (260)

1. For elements listed in the same columns of the periodic chart, which property increases moving from top to bottom?

   A. concentration

   B. half-life

   ✔ C. atomic weight

   D. hardness

Reporting Category for Question 1: **Properties of Matter (pp. 204-205)**

2. The cell structure that makes a plant cell more rigid than an animal cell is the

   A. cell membrane.

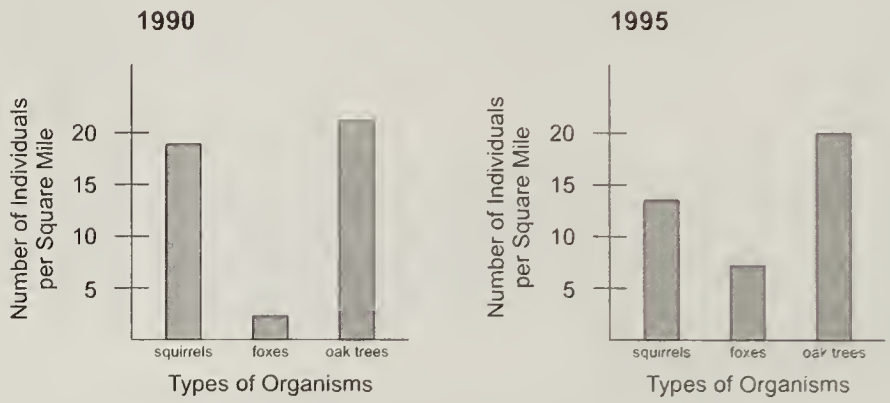
   B. cytoplasm.

   ✔ C. cell wall.

   D. ribosome.

Reporting Category for Question 2: **Characteristics of Organisms (p. 206)**

3. According to the graphs, there were fewer squirrels per square mile in 1995 than in 1990. Based on information in the graphs, the most likely reason for the change in squirrel population is that



A. less food was available for the squirrels in 1995 than in 1990.

B. more food was available for the squirrels in 1995 than in 1990.

C. there were fewer predators in 1995 than in 1990.

✔ **D. there were more predators in 1995 than in 1990.**

Reporting Category for Question 3: **Ecosystems and Organisms (p. 207)**

4. Which statement best describes the relationship between the total amount of water vapor the atmosphere can hold and the temperature of the atmosphere?

A. The amount of water vapor is not related to atmospheric temperature.

✔ **B. The amount of water vapor increases as the atmospheric temperature increases.**

C. The amount of water vapor increases as the atmospheric temperature decreases.

D. The amount of water vapor decreases as the atmospheric temperature increases.

Reporting Category for Question 4: **Interactions and Cycles in the Earth System/Earth's History (pp. 208-209)**

5. Which statement about photosynthesis and respiration is true?

✔ **A. Photosynthesis stores energy and respiration releases energy.**

B. Respiration stores energy and photosynthesis releases energy.

C. Photosynthesis and respiration are the same process.

D. Photosynthesis and respiration do not have anything to do with energy.

Reporting Category for Question 5: **Characteristics of Organisms (p. 206)**

Victoria, in Canada's British Columbia, and Minot, North Dakota, are located at about the same latitude and are about the same height above sea level. The chart shows the average temperatures in these cities during January.

Average Daily Temperature in January	
Victoria	4°C
Minot	−14°C

6. Which best explains why it is warmer in Victoria?

✔ **A. Victoria is near the ocean and water moderates its temperature.**

B. Arctic air masses do not move readily into islands such as the one Victoria is on.

C. The Pacific Ocean is warmer than the Atlantic.

D. Victoria receives more direct sunlight than Minot.

Reporting Category for Question 6: **Interactions and Cycles in the Earth System/Earth's History (pp. 208-209)**

7. Which statement about the Sun is true?

A. The Sun is a very large star that exists far from the Milky Way Galaxy.

B. The Sun is at the center of the Milky Way Galaxy.

✔ **C. The Sun is a medium-sized star near the edge of the Milky Way Galaxy.**

D. The Sun has the Milky Way and several other galaxies moving in orbits around it.

Reporting Category for Question 7: **Earth and Space (p. 209)**

8. Many common hand tools create a mechanical advantage by using the basic principles found in simple machines. For example, a screwdriver uses the principles of the wheel and axle. In order to increase gripping force, pliers use the principle demonstrated in the

A. pulley.

✔ **B. lever.**

C. wedge.

D. screw.

Reporting Category for Question 8: **Understanding and Using Technology (pp. 210-211)**

9. Lemon juice turns litmus paper red, is corrosive and tastes sour. Lemon juice is classified as

✔ A. an acid.

B. a base.

C. an element.

D. More information is needed to classify lemon juice.

Reporting Category for Question 9: **Properties of Matter (pp. 204-205)**

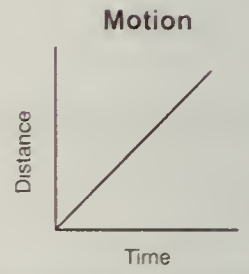
10. The graph represents the motion of a body that is moving with

A. increasing acceleration.

B. decreasing acceleration.

C. increasing speed.

✔ D. constant speed.



Reporting Category for Question 10: **Motion (p. 205)**

To study the effect of heat on plant growth, Andy divided ten identical seedlings into groups. She placed one group on a windowsill in the sun and the other group in a dark closet on the cool (north) side of the house.

11. Think about the characteristics of a properly designed scientific experiment. What is wrong with the above experiment?

A. The temperature difference between the two groups was not great enough.

✔ B. The amount of light was different for the two groups.

C. One group of seedlings got less water than the other.

D. Nothing is wrong with the experiment.

Reporting Category for Question 11: **Designing an Investigation (pp. 203-204)**

12. Recently the telephone company announced the implementation of a new telephone area code for Massachusetts. What technological changes are responsible for the need for a new area code?

A. the increased size of the telephone book

✔ **B. the increase in use of modems, fax machines, and cellular phones**

C. the increase in use of speed dialing and call waiting

D. the increased demand for telephone repairs and installation

Reporting Category for Question 12: **Understanding and Using Technology (pp. 210-211)**

13. Which is not a major controversial issue associated with the use of nuclear power?

A. the disposal of nuclear waste products

B. the health hazards in areas surrounding nuclear plants

C. the thermal pollution of water bodies used for cooling

✔ **D. the unemployment due to conversion to nuclear power**

Reporting Category for Question 13: **Science, Technology, and Human Affairs (p. 211)**

Multiple-choice Questions, Session 2

14. The light bulbs shown in the diagram below are connected in a series circuit.

Suppose that one of the bulbs is burned out and you want to determine which one it is. What could you do to determine which bulb is burned out?

✔ A. Place the plug into an electrical outlet and substitute new bulbs, one at a time, until all three bulbs light.

B. Place the plug into an electrical outlet and notice which bulb does not light.

C. Place the plug into an electrical outlet and remove one bulb at a time until the other two light.

D. There is no way to determine which bulb is burned out when they are connected in a series circuit.

Reporting Category for Question 14: **Energy (pp. 205-206)**

15. Which of the substances shown in the chart could be sugar?

A. Substance W

B. Substance X

✔ C. Substance Y

D. Substance Z

Property	Substance W	Substance X	Substance Y	Substance Z
State	solid	solid	solid	liquid
Attracted to Magnet?	yes	no	no	yes
Dissolves in Water?	yes	no	yes	no
Color	white	white	white	silver

Reporting Category for Question 15: **Properties of Matter (pp. 204-205)**

16. If the number of trees significantly decreases, the atmosphere's level of which gas might significantly increase?

A. nitrogen

✔ B. carbon dioxide

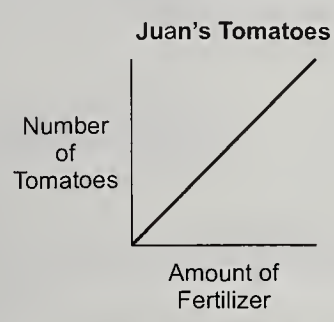
C. carbon monoxide

D. hydrogen

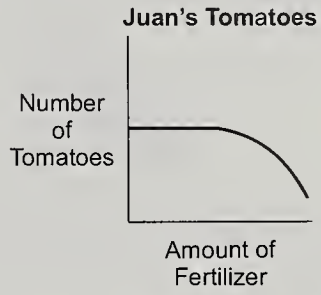
Reporting Category for Question 16: **Ecosystems and Organisms (p. 207)**

17. Juan wanted to know if fertilizer could help him grow more tomatoes. He divided his garden into three equal areas and used different amounts of fertilizer in each area. At the end of the summer, Juan concluded that fertilizer helped grow more tomatoes but that too much fertilizer was harmful. Which graph shows the effects of fertilizer on the number of tomatoes produced?

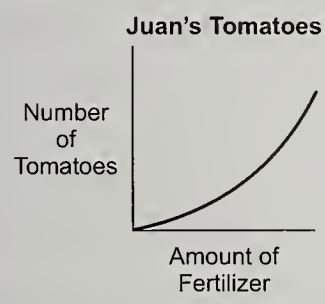
A.



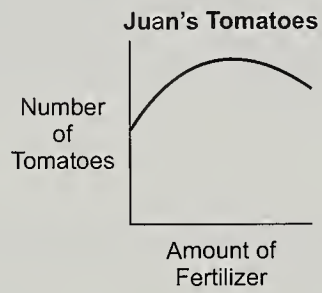
C.



B.



✔ D.



Reporting Category for Question 17: **Analysis and Interpretation of Data (p. 204)**

18. Frame construction predominates in the New England area due to the abundance of

A. clay.

B. masonry.

✔ C. **wood.**

D. steel.

Reporting Category for Question 18: **Understanding and Using Technology (pp. 210-211)**

19. A solar eclipse occurs when

✔ **A. the Moon blocks the Earth from the Sun.**

B. the first four planets in the solar system are aligned.

C. Earth blocks the Moon from the Sun.

D. Earth's shadow falls on the Sun.

Reporting Category for Question 19: **Earth and Space (p. 209)**

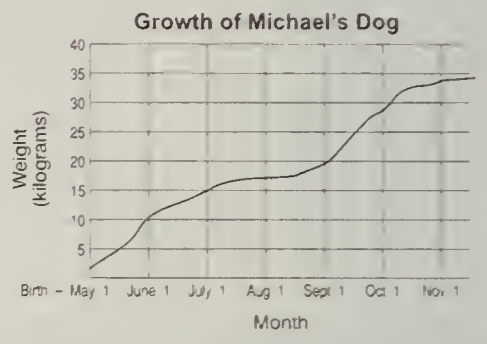
Multiple-choice Questions, Session 3

Michael kept a record of his dog's weight from birth on May 1 in order to find out how much dog food to give his dog. The directions on the bag of dog food are as follows:

Weight of Dog	Number of Cups of Food Daily
Under 10 kilograms	1
10 to 20 kilograms	2
21 to 30 kilograms	3
Over 30 kilograms	4

The graph below shows Michael's record of his dog's weight.

20. In which month should Michael start feeding his dog 4 cups of food per day?



A. August

B. September

✔ C. October

D. November

Reporting Category for Question 20: **Analysis and Interpretation of Data (p. 204)**

21. A manufacturing industry has asked to relocate its plant to your town. From an environmental perspective, which question is least important to ask before deciding whether the industry may move to your town?

A. How will the plant affect wildlife of the area?

B. What kinds of pollution will the plant produce?

C. What impact will the plant have on the population of the town?

✔ **D. What are the uses of the products that the plant will manufacture?**

Reporting Category for Question 21: **Science, Technology, and Human Affairs (p. 211)**

22. A plant scientist is developing a new fertilizer called Hypergrow. She designs an experiment to test whether Hypergrow helps plants grow faster than Supergrow, a fertilizer already on the market. Which of the following should the scientist do with light during the experiment?

✔ **A. Apply the same amount of light to all the plants.**

B. Apply only green light to all the plants.

C. Flash the lights to simulate a partly cloudy day.

D. Keep the plants in darkness.

Reporting Category for Question 22: **Designing an Investigation (pp. 203-204)**

23. What type of transportation, shown below, existed in the United States first?

A.

C.

✔ B.

D.

Reporting Category for Question 23: **Understanding and Using Technology (pp. 210-211)**

24. Nearly 100 years ago, a large volcano erupted in the South Pacific. The following year, Boston recorded measurable snow every month of the year, and most of the Northern Hemisphere experienced a cold summer. Which explains how these two events were related?

A. The eruption intensified the greenhouse effect.

B. Lava flow from the eruption caused a temporary increase in Earth's total heat energy.

C. The eruption caused damage to the ozone layer.

✔ D. Air pollution from the eruption caused a decrease in the amount of solar energy reaching Earth.

Reporting Category for Question 24: **Interactions and Cycles in the Earth System/Earth's History (pp. 208-209)**

25. In pea plants, tall is dominant over short. What size pea plants would result when two short plants are crossed?

✔ A. short plants only

B. short and tall plants

C. tall plants only

D. middle-sized plants

Reporting Category for Question 25: **Diversity, Adaptation, and Reproduction of Organisms (p. 207)**

26. The evidence gained from a design activity is often used to gather information about a technological problem. A design activity is more valid if it

A. includes many steps.

B. is recorded by a team of scientists.

✔ C. includes repeated trials.

D. is performed in a laboratory.

Reporting Category for Question 26: **The Design Process (p. 210)**

Open-response Questions, Session 1

27. The total amount of water on Earth and in its atmosphere remains almost constant. Living things are always using water, yet the total amount doesn't change. Explain in as much detail as possible what this statement means and how this occurs. You may use diagrams to help explain your answer.

Reporting Category for Question 27: **Interactions and Cycles in the Earth System/Earth's History (pp. 208-209)**

28. You are to do an experiment that will determine which material, wool or plastic, would be best to make a jacket that would keep you warmer if you sat quietly outside on a very cold day when there was no wind.

    You have the following materials:

    - paper and pencil for recording results
    - 2 insulated containers
    - pins, rubber bands, tape, scissors
    - a timer or stopwatch
    - 5 cans
      -1 large metal can
      -1 small metal can
      -2 medium metal cans
      -1 medium plastic can
    - lids for the cans with openings for thermometers
    - 2 thermometers
    - 1 ruler
    - 2 materials to be tested (plastic and wool)
    - paper towels
    - access to hot and cold water

a. Tell exactly which items/materials you would use and how you would use them in your experiment.

b. Describe the variables you would control and explain how you would control them.

c. Describe in detail the information you would record and how you would interpret your data.

Reporting Category for Question 28: **Designing an Investigation (pp. 203-204)**

Open-response Questions, Session 2

29. The table below shows the average height of males and females at different ages. Study the chart; then answer the questions based on the information in the chart.

AVERAGE HEIGHT OF MALES AND FEMALES

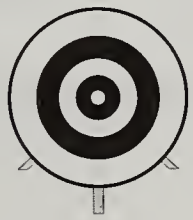
Age of Male or Female	Female Height	Male Height
8 years old	137 cm	135 cm
9	143	140
10	150	145
11	163	150
12	170	155
13	172	155
14	173	175
15	173	180
16	173	182
17	173	183
18	173	183

a. State one conclusion you can make about the relationship between the age of a person and his or her height. Give an example of your conclusion using numbers from the chart.

b. State one conclusion you can make about the average height of girls versus the average height of boys from ages 9 to 11. Give a specific example using numbers in the chart.

c. State one other conclusion you can make from information in the chart and support it by using numbers in the chart.

Reporting Category for Question 29: **Analysis and Interpretation of Data (p. 204)**



30. Imagine that you are about to shoot an arrow at the target shown above from a distance of thirty meters. Your goal is to hit the bull's eye. As you face the target, you notice there is a crosswind moving from your left to your right side.

a. Describe where you would aim relative to the bull's eye.

b. Identify **three** forces acting on the arrow as you release it and as it travels through the air. Explain the effect of each force on the arrow.

Reporting Category for Question 30: **Motion (p. 205)**

Open-response Questions, Session 3

31. Design a backpack to be used for a three-day hike in the Berkshire Mountains.

    a. Describe three physical properties that the material used to construct the backpack must have.

    b. Why are these properties important?

    c. Generate a design sketch of the backpack and label its components.

Reporting Category for Question 31: **The Design Process (p. 210)**

32. You have decided to raise a tomato plant in a pot. As the plant begins to grow, you must decide where to place the plant so it will have the best growing conditions. You have three possible places to put the plant.

    Look at the pictures. What additional information would help you decide where to put the plant? Explain why this new information would be helpful.

Reporting Category for Question 32: **Diversity, Adaptation, and Reproduction of Organisms (p. 207)**

MASSACHUSETTS DEPARTMENT OF EDUCATION

MCAS

MASSACHUSETTS COMPREHENSIVE ASSESSMENT SYSTEM

X. Science & Technology Grade 10

Massachusetts Department of Education

Curriculum Framework *Learning Standards/ MCAS Reporting Categories*

Science & Technology, Grade 10

The learning standards in this section are quoted directly from the Massachusetts *Science & Technology Curriculum Framework*.[1] The *Framework* defines four content strands, with three major divisions within the *Domains of Science* strand:

- *Inquiry*
- *Domains of Science*
  - *Physical Sciences*
  - *Life Sciences*
  - *Earth and Space Sciences*
- *Technology*
- *Science, Technology, and Human Affairs*

For reporting purposes, the *MCAS Science & Technology Guide*[2] divided each strand (except for *Science, Technology, and Human Affairs*) into multiple MCAS reporting categories for each grade. Learning standards are grouped below under the MCAS reporting category headings.[3] Applicable *Framework* page numbers are given in brackets following each heading.

Each common item in the second section of this chapter is followed by a reference to the reporting category that contains the learning standard(s) to which the item is related.

Inquiry

Designing an Investigation (*Framework* pp. 28–29)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- distinguish those observations that are relevant to the question or problem at hand.
- formulate testable questions and generate explanations using the results of predictions.
- use a range of exploratory techniques, e.g., experiments, information/literature searches, data logging, research, and development, etc.

(continued on next page)

[1] Massachusetts Department of Education, *Science & Technology Curriculum Framework: Owning the Questions Through Science & Technology* (Malden, 1996).

[2] Massachusetts Department of Education, *Guide to the Massachusetts Comprehensive Assessment System: Science & Technology* (Malden, 1998).

[3] A very small percentage—less than 1%—of *Science & Technology Curriculum Framework* learning standards that are impractical to test in a large-scale assessment are not tested by MCAS (e.g., at grade 10: "use a range of exploratory techniques, e.g., experiments, information/literature searches, data logging, research and development"). These learning standards are not included in this document.

- make decisions about the range and number of independent variables and how to control other variables in designing experiments.
- select and use common and specialized tools to measure the dependent variable.
- select appropriate methods of recording and interpreting data.

Analysis and Interpretation of Data (*Framework* p. 29)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- accurately use scientific and technological nomenclature, symbols and conventions when representing and communicating ideas, procedures, and findings.
- select appropriate means for representing, communicating, and defending a scientific and technological argument.
- question interpretations or conclusions for which there is insufficient supporting evidence, and recognize that any conclusion can be challenged by further evidence.
- formulate further testable hypotheses based on the knowledge and understanding generated.
- interpret data in the light of experimental findings, and appropriate scientific and technological knowledge and understanding.

Domains of Science: Physical Sciences

Structure of Matter (*Framework* p. 50)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- explore and describe how matter is made up of elements, compounds, and numerous mixtures of these two kinds of substances.
- demonstrate through the use of manipulatives that atoms interact with one another by transferring or sharing electrons that are furthest from the nucleus.
- represent an understanding that compounds form when atoms of two or more elements bond.
- group elements and compounds into classes, based on similarities in their structures and resulting properties.
- describe an understanding that nuclear changes often result in the emission of high-energy electromagnetic radiation and particles, and present evidence on ways that this has physical repercussions on other materials.
- illustrate an understanding that energy [that] is released in certain nuclear reactions and chemical reactions can be controlled and put to use, or released suddenly and destructively in explosions, fire, or high-energy chemical events.

Interactions of Substances (*Framework* p. 50)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- present evidence that solubility of substances may vary with temperature and with the natures of the solute and the solvent.
- suggest how balanced electrical forces between the charges of the protons and electrons are responsible for the stability of substances.
- explain chemical changes in terms of rearrangements of atoms or molecules, which are made possible by the breaking and forming of chemical bonds.
- summarize chemical reactions by symbolic or word equations that specify the reactants and products involved.
- illustrate ways in which the periodic table is useful in predicting the chemical and physical properties of known elements and those yet to be discovered.

Position and Motion of Objects (*Framework* p. 51)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- demonstrate that all forces are vector quantities, having both magnitude and direction.
- represent an understanding that if an object exerts a force on a second object, then the second object exerts an equal and opposite force on the first object.
- describe and represent changes in motion or momentum in terms of being caused by forces.

Energy (*Framework* p. 51)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- explore and explain how the total amount of mass and energy remains constant in any closed system.
- describe the nature of waves, such as electromagnetic waves or sound waves, in terms of wave length, amplitude, frequency, and characteristic speed.
- design and conduct an investigation that explores how electromagnetic waves, unlike sound waves, can be transmitted through a vacuum.
- demonstrate that the same concepts of energy, matter and their interaction apply both to biological and physical systems on Earth and in the observable universe.

Domains of Science: Life Sciences

Characteristics of Organisms (*Framework* p. 65)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- examine evidence and demonstrate that many molecular aspects of life processes of multicellular organisms occur in cells.
- investigate and describe understanding that cells have particular structures that underlie their functions.
- compare and contrast the cell boundaries that control what can enter and leave the cell. Realize that in all but quite primitive cells, a complex network of proteins provides organization and shape.
- give evidence that all organic molecules are constructed of four fundamental elements, i.e., carbon, hydrogen, oxygen and nitrogen.

Heredity and Evolution (*Framework* pp. 65–66)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- describe the theory of biological evolution which states that the earth's present-day species are descended from earlier species.
- describe ways in which genetic variation is preserved or eliminated from a population through natural selection.
- examine and summarize evidence that evolution builds on what already exists, so the more variety there is, the more there can be in the future. But know that evolution does not necessitate long-term progress in some set direction.
- give evidence that cells are the repositories of biological information.
- explore and illustrate that chromosomes are the components of cells which convey hereditary information from one cell to its daughter cells and from a parent to its offspring.
- illustrate an understanding that chromosomes are composed of subunits called genes; each gene encodes the information directing the synthesis of a cell product, usually a protein, and can often be identified with a trait observed in the organism.
- describe the structure and function of DNA.

- give evidence that in reproductive processes involving two parents (sexual reproduction), two specialized reproductive cells (gametes), one from each parent (zygote), direct the formation of a new organism that has attributes of both parents.
- discriminate between characteristics that result from the operation of a single gene and some that result from the action of several genes.

Ecosystems (*Framework* p. 66)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- examine and describe ways in which the conservation of energy law is a powerful tool for the analysis of energy flow in ecosystems.
- demonstrate an understanding that energy is supplied to ecosystems by sunlight and dissipates as heat. Know that the principal pathway of this dissipation is cellular respiration.
- illustrate an understanding that plants convert light energy into chemical energy.
- explore and illustrate why carbon compounds produced by plants (carbohydrates and oils) are the primary source of energy for all animal life.

Domains of Science: Earth and Space Sciences

Earth's Processes (*Framework* pp. 80–81)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- demonstrate an understanding that two fundamental forces acting in the Earth System are gravity and electromagnetism. Examine evidence that gravitational force acts between masses and is responsible for changes in the motion of objects on Earth and throughout the universe. Know that electromagnetic force holds matter together; recognize that the Earth itself acts like a magnet.
- observe and illustrate that life is adapted to conditions on the Earth, including the force of gravity that enables the planet to retain an adequate atmosphere, and an intensity of radiation from the sun that allows water to cycle between liquid and vapor.
- examine and give evidence that life has changed the planet in dramatic ways; vegetation and other life forms make important contributions to changes in the face of Earth.
- examine and describe evidence that rocks are continuously being modified by processes such as weathering, erosion, deposition, compaction, cementation, melting, heating (without melting), pressure, and crystallization.

(continued on next page)

- examine models and illustrate that global wind patterns within the atmosphere are determined by the unequal heating between the equator and poles, Earth's rotation, and the distribution of land and ocean. Consequently, weather in northern and southern mid-latitudes tends to move eastward while in the tropics it moves westward. Illustrate understanding that atmospheric winds transport heat poleward from the warm tropics, helping to maintain Earth's climate.

- relate and demonstrate an understanding that the solid crust of the Earth—including both the continents and the ocean basins—consists of separate plates that ride on a denser, hot, gradually deformable layer of the Earth.

- investigate and illustrate the theory that land forms of various shapes and sizes result from both constructive and destructive processes.

- examine and describe evidence that the "solid" Earth has a layered structure, with each layer having characteristic composition and physical properties. A solid inner core is surrounded by a liquid outer core, which in turn is surrounded by a large zone of dense mantle material. The crust is relatively thin compared to the other layers of Earth's interior.

Solar System and Universe (*Framework* p. 80)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- give evidence that the universe is estimated to be over ten billion years old, and know some of the evidence for this estimate.

- examine and describe evidence that led to the theory that the Solar System was formed from a cloud of gas and dust that condensed under the influences of gravity and rotation.

- examine and describe evidence that the Milky Way is but one galaxy in a vast, ancient, and expanding universe, which contains a tremendous number of galactic clusters. Convey understanding that most of the universe appears to be empty space, but that more and more kinds of materials are being discovered in interstellar space.

Technology

The Design Process (*Framework* p. 96)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- identify a problem or design opportunity that has not necessarily been solved before.

- propose designs and choose among suggested solutions.

- implement a proposed solution that conforms to the design constraints.
- evaluate the solution and its consequences against planned criteria.
- communicate the problem, process and solution.
- redesign the solution.

Understanding and Using Technology (*Framework* pp. 99–100)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- describe examples of the wide range of contemporary tools that are used to process and measure materials, energy, physical phenomena, and electronic signals. Some of these include measuring instruments, computer-based tools, and data-capturing sensors.
- use complex tools, machines, and equipment to solve problems.
- identify appropriate ways to select, operate, maintain, and dispose of technological devices.
- identify particular characteristics of material resources, i.e., synthetic, composite, and biological. Explain how various energy sources and forms of information are also resources with specific characteristics.
- discuss issues of resource management including safety, costs, environmental and political concerns.
- give examples of how combinations of graphic and electronic communication processes are used in developing high technology communication systems.
- describe uses of material conversion processes, i.e., separating, forming, conditioning and combining, in production processes.
- identify ways that manufacturing processes have changed with improved tools and techniques.
- compare how existing transportation technologies convey people and products globally.
- give examples of ways in which technological processes could adversely affect the environment.
- give examples of how a technology device, service, or system is used for a particular purpose.
- give examples of how technology has played a key role in the operation of successful Massachusetts and United States businesses.

(continued on next page)

- describe examples of new and emerging technologies in areas of communication, construction, manufacturing, transportation, power, and bio-related technology.
- provide examples of how technology creates new jobs and makes other jobs obsolete.

Science, Technology, and Human Affairs

Science, Technology, and Human Affairs (*Framework* pp. 99 and 111)

Students engage in problem solving, evaluating evidence, searching for connections, and the process of inquiry, in order to

- describe ways in which technological impacts can be multidimensional (i.e., economic, social, environmental, political).[4]
- describe ways in which technological inventions and innovations stimulate economic competitiveness and are translated into products and services with marketplace demands.[5]
- participate in technological society as active citizens, consumers, workers, employers, and family members.[6]
- identify situations in which science, technology, and society have influenced each other in the past and describe how science and technology have been an integral part of the history of human society.
- describe situations that illustrate how scientific and technological revolutions have changed society.
- develop skills in applying scientific knowledge to make decisions about problems at the community, state, national and international levels, and recognize that using these skills responsibly is an essential part of being a citizen in today's world.
- describe ways in which technological development has been influenced by the culture of the society and by the resources available to that society.
- give evidence that rapidly changing technology affects global competition and jobs.

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[4] This learning standard derives from the *Technology* strand of the *Framework*.
[5] See note 4.
[6] See note 4.

MCAS May 1998 Common Test Items

Science & Technology, Grade 10

Number of Sessions

Grade 10 MCAS Student Test Booklets included 4 separate Science & Technology test sessions. Each session included multiple-choice and open-response questions.

Formatting in this Document

In this document, all common multiple-choice questions are shown first, followed by common open-response questions. The test session in which each group of questions appeared is identified before the first question from that session.

Materials are not formatted exactly as they appeared in Student Test Booklets. For instance, in order to present items most efficiently in this document, the following modifications have been made:

- Some fonts and/or font sizes have been changed and/or reduced.
- Some graphics which appeared above questions in Student Test Booklets are shown instead to the side.
- Most graphics have been reduced in actual size from but maintain the same proportions as those that appear in Student Test Booklets.

Correct Answers

Correct answers for **multiple-choice questions** are shown in **bold** and indicated by a check mark.

An overview of procedures for scoring responses to MCAS **open-response questions** can be found in the MCAS fact sheet, "Facts on Scoring of Student Answers to Open-Response Questions and Writing Prompts," which is available on the Department's Internet site at **www.doe.mass.edu.** Scoring procedures are also explained further in the MCAS document, *Guide to Interpreting the 1998 MCAS School and District Reports,* which is due for release in late fall 1998.

Multiple-choice Questions, Session 1

1. Newton's Third Law of Motion states that every force is accompanied by an equal and opposite force. This is best illustrated by

✔ **A. a basketball bouncing on the floor.**

B. a book sliding off the car seat when the car turns a corner.

C. a car accelerating as it rolls down a hill.

D. a pencil falling off a table.

Reporting Category for Question 1: **Position and Motion of Objects (p. 229)**

The diagrams below show one way of thinking about and representing the structure of atoms.

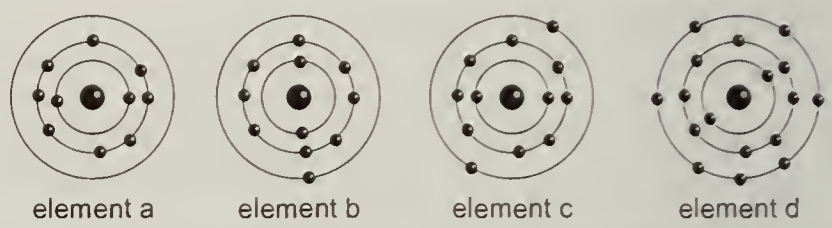
2. Which element would give up two electrons in forming an ionic bond?

A. element a

B. element b

✔ C. element c

D. element d



Reporting Category for Question 2: **Structure of Matter (p. 228)**

3. Statements outlining the expectations for a technological device or system are called

✔ **A. design criteria.**

B. specification sheets.

C. legal information.

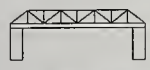
D. prototypes.

Reporting Category for Question 3: **The Design Process (pp. 232-233)**

4. Which of the following bridge designs would be the best choice for crossing a river one-half mile wide?

A.

B.

C. 

✔ D.

Reporting Category for Question 4: **The Design Process (pp. 232-233)**

5. The best method to ensure that traffic will run efficiently is

✔ **A. installing traffic lights.**

B. repaving the roads.

C. closing side streets to traffic.

D. posting speed limit signs.

Reporting Category for Question 5: **The Design Process (pp. 232-233)**

6. Microwave ovens were developed as a spin-off of research in

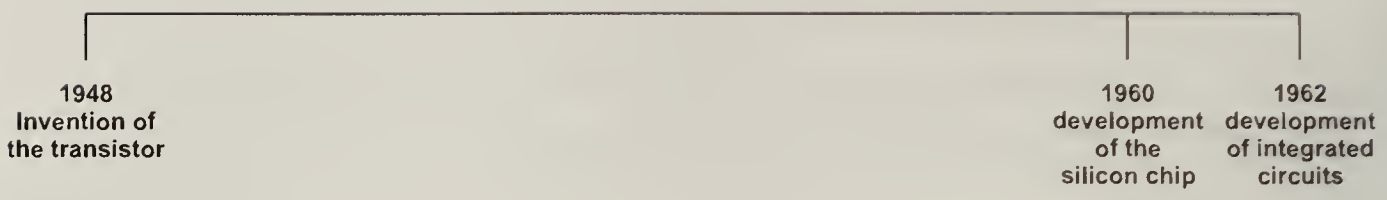
A. laser technology.

✔ B. radar systems.

C. geothermal energy.

D. refrigeration systems.

Reporting Category for Question 6: **Understanding and Using Technology (pp. 233-234)**



7. The timeline above traces technological innovations that led to the development of

   A. air conditioning.

   ✔ B. cellular phones.

   C. manual typewriters.

   D. electric motors.

Reporting Category for Question 7: **Understanding and Using Technology (pp. 233-234)**

8. The size of a population in a community is limited by the

   ✔ A. carrying capacity of ecosystems.

   B. density of the decomposer populations.

   C. increase in the birth rate over immigration.

   D. seasonal times of interbreeding.

Reporting Category for Question 8: **Ecosystems (p. 231)**

9. In the equation in the box, the 2 in $2NaN_3$ refers to the number of

   A. atoms of sodium.

   B. atoms of nitrogen.

   ✔ C. moles of sodium azide.

   D. moles of nitrogen.

Airbags

Airbags are currently standard equipment in most automobiles. Airbags are activated when a severe impact causes a steel ball to compress a spring and electrically ignite a detonator cap. This series of events causes the following explosive chemical reaction.

$2NaN_3\ (s) \rightarrow 2Na\ (s) + 3N_2\ (g)$
sodium azide — sodium nitrogen

Reporting Category for Question 9: **Interactions of Substances (p. 229)**

10. Which organism serves as the primary producer in an aquatic food chain?

✔ A. algae

B. *Daphnia*

C. minnows

D. bass

Reporting Category for Question 10: **Ecosystems (p. 231)**

11. The apparent brightness of a star as it appears from Earth depends on its distance from Earth and its

✔ A. temperature.

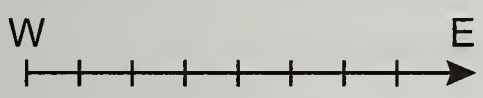
B. moisture content.

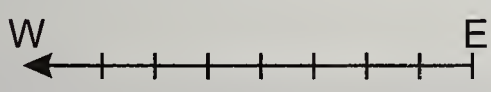
C. acceleration.

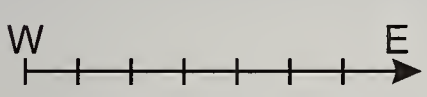
D. constellation.

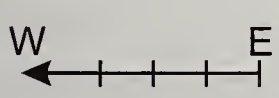
Reporting Category for Question 11: **Solar System and Universe (p. 232)**

12. A resultant vector represents the sum of two or more vectors. If Juan walks 200 m east and then 600 m west, which diagram represents the resultant vector of Juan's walk?

A. 

B. 

C. 

✔ D. 

Key: each division = 100 meters

Reporting Category for Question 12: **Position and Motion of Objects (p. 229)**[7]

[7] Results from question 12 were not included in scores for students who took the Spanish-language version of MCAS.

Water Quality

Table 1 lists the concentration of various compounds at the four different sampling sites on the large lake shown on the map below. Water sampling at all sites was done simultaneously and under the same conditions using the same equipment. The water samples were taken to the lab for analysis.

Figure A

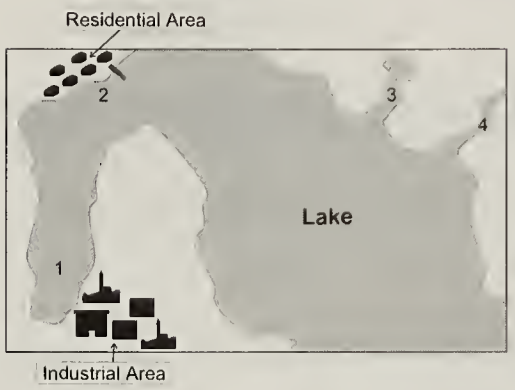


Table 1

Sampling Site	Site Characteristics	Concentration of dissolved substances in parts per million (ppm)		
		oxygen	nitrate	phosphate
1	Heavily-populated industrial area; water is heavily polluted	0.01	22.3	18.8
2	A small fishing village; small population	4.0	3.2	2.8
3	A small bay surrounded by cleared land used for agriculture	2.0	14.5	17.9
4	A river that runs through the most forested, protected area shown on the map	8.0	2.1	1.9

13. Which statement best explains why the dissolved oxygen level at Site 4 is highest of all the samples?

A. The river is heavily polluted.

B. There is heavy industrial activity in the area.

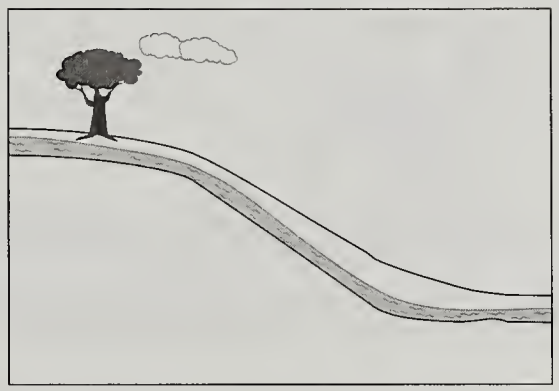
C. The phosphate and nitrate levels are high.

✔ **D. Site 4 is at the mouth of a river of moving water.**

Reporting Category for Question 13: **Interactions of Substances (p. 229)**

Multiple-choice Questions, Session 2

14. The primary force responsible for the flow of water in this stream is



A. solar energy.

B. magnetic fields.

✔ C. **gravity.**

D. wind.

Reporting Category for Question 14: **Earth's Processes (pp. 231-232)**

15. Genes are the basic unit of heredity. Genetic information is encoded in a linear sequence of

A. amino acids.

B. fatty acids.

✔ C. **nucleic acids.**

D. carbohydrates.

Reporting Category for Question 15: **Heredity and Evolution (pp. 230-231)**

16. Which of the following natural phenomena are evidence of the gravitational attraction between the moon and Earth?

A. winds

B. sunspots

C. eclipses

✔ D. **tides**

Reporting Category for Question 16: **Earth's Processes (pp. 231-232)**

17. The energy from foods is not used directly; it is stored in a high-energy molecule called

✔ **A. ATP.**

B. ADP.

C. DNA.

D. STP.

Reporting Category for Question 17: **Ecosystems (p. 231)**

18. The process by which information can be changed into different forms that can be coded, transmitted, decoded, stored, and retrieved is called

✔ **A. communication technology.**

B. transportation technology.

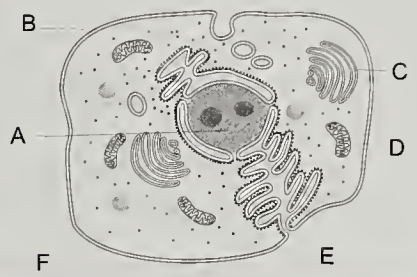
C. advertising.

D. graphic arts.

Reporting Category for Question 18: **Understanding and Using Technology (pp. 233-234)**

Multiple-choice Questions, Session 3

19. In eukaryotic cells, information that is passed from parent cell to daughter cells is stored in



✔ A. structure A.

B. structure B.

C. structure C.

D. structure D.

Reporting Category for Question 19: **Characteristics of Organisms (p. 230)**

20. A conglomerate is a type of rock composed of small pebbles and sand grains cemented together. It is classified as

A. igneous.

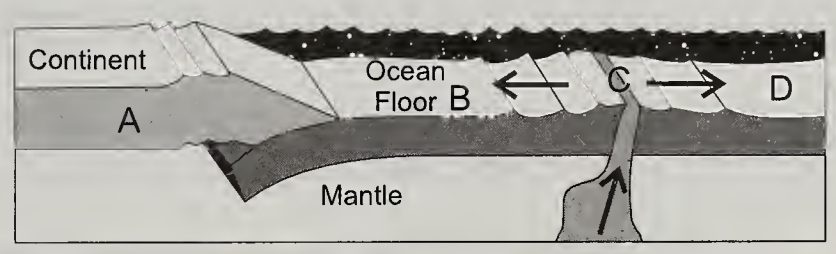
B. metamorphic.

C. mineral.

✔ D. sedimentary.

Reporting Category for Question 20: **Earth's Processes (pp. 231-232)**

21. The diagram represents a divergent plate boundary similar to the one found along the mid-Atlantic ridge. At which location would you find the most recently formed rock?



A. location A

B. location B

✔ C. location C

D. location D

Reporting Category for Question 21: **Earth's Processes (pp. 231-232)**

Use the information below to answer question 22.

Given the following:
Y = yellow seeds
y = green seeds
R = round seeds
r = wrinkled seeds
Yellow (Y) is dominant to green (y).
Round (R) is dominant to wrinkled (r).

22. The genotype of a yellow wrinkled seed could be represented as

✔ **A. YYrr.**

B. YYRr.

C. YYRR.

D. yyrr.

Reporting Category for Question 22: **Heredity and Evolution (pp. 230-231)**

23. The water cycle can occur

A. without an input of energy into the cycle.

✔ **B. in the absence of living organisms.**

C. only during daylight.

D. only in the vicinity of oceans.

Reporting Category for Question 23: **Earth's Processes (pp. 231-232)**

24. Which of the following aspects of electromagnetic radiation best explains why electromagnetic radiation can be both useful and harmful to humans?

A. Electromagnetic radiation travels at the speed of light.

B. Electromagnetic radiation can travel through a vacuum.

✔ **C. Electromagnetic radiation is energy and can interact with matter.**

D. Electromagnetic radiation can be described in terms of both wavelength and frequency.

Reporting Category for Question 24: **Energy (p. 229)**

25. In New England, it is warmer in July than in December because

A. Earth is closer to the sun during the summer.

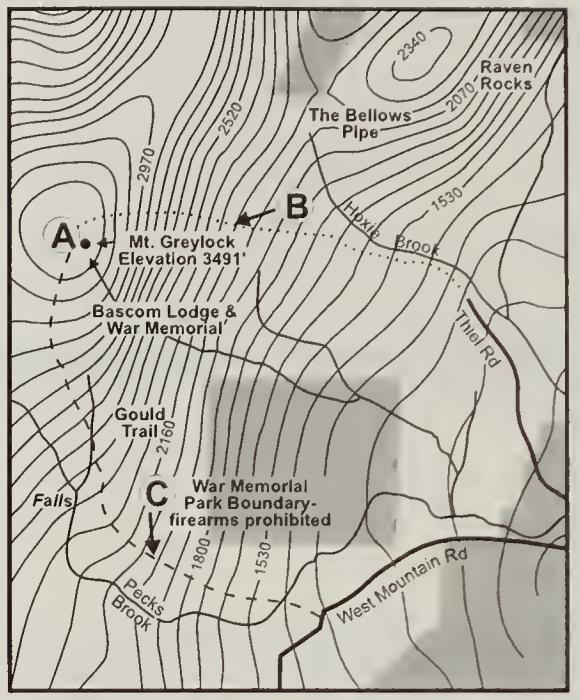
✔ **B. the Northern Hemisphere is tilted toward the sun during the summer.**

C. people and animals contribute more body heat to the atmosphere during the summer.

D. the ocean radiates heat to the atmosphere during the summer and absorbs heat during the winter.

Reporting Category for Question 25: **Earth's Processes (pp. 231-232)**

Multiple-choice Questions, Session 4



Map interval = 90 feet

1 inch = 3000 feet

26. The type of land form at point B is most likely a

A. river valley.

B. coastal plain.

✔ C. **steep slope.**

D. tunnel.

Reporting Category for Question 26: **Earth's Processes (pp. 231-232)**

27. Exothermic reactions

✔ A. **release heat to the surroundings.**

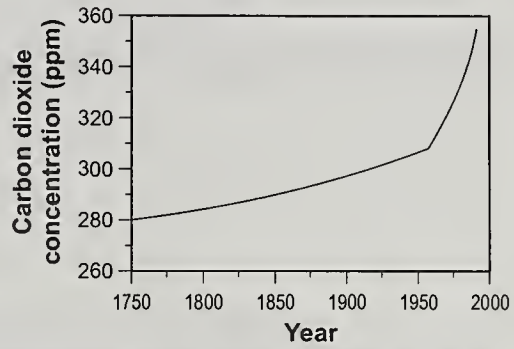
B. cannot occur in nature.

C. absorb heat from the surroundings.

D. cannot occur in living systems.

Reporting Category for Question 27: **Structure of Matter (p. 228)**

28. What was the approximate change in the concentration of carbon dioxide over the time period shown in the graph?



A. 25 ppm

✔ B. 75 ppm

C. 100 ppm

D. 150 ppm

Reporting Category for Question 28: **Analysis and Interpretation of Data (p. 228)**

29. A cell wall and chloroplasts are found in

✔ A. plant cells.

B. animal cells.

C. fungal cells.

D. epidermal cells.

Reporting Category for Question 29: **Characteristics of Organisms (p. 230)**

30. One way that companies remain economically competitive is by reducing warehouse costs through

A. CAD graphic systems.

✔ B. JIT inventory control.

C. CIM manufacturing systems.

D. TIF computer systems.

Reporting Category for Question 30: **Understanding and Using Technology (pp. 233-234)**

Open-response Question, Session 1

31. Air temperature measured in most urban areas is much warmer than the air temperature measured in rural areas. Explain two scientifically valid reasons for this observation.

Reporting Category for Question 31: **Earth's Processes (pp. 231-232)**

Open-response Questions, Session 2

32. In our technological world there are three phases of technology:
    - yesterday technology
    - today technology
    - tomorrow technology

    a. Select **one** area of technology, such as construction, manufacturing, communication, power, or bio-related, and describe an example of a technology tool or system from each phase.

    b. Explain why you characterized the selected tool or system in that phase.

Reporting Category for Question 32: **Understanding and Using Technology (pp. 233-234)**

33. Recently scientists have discovered very similar skeletons of three dinosaurs on three different continents.

    Gigantosaurus was found in South America.
    Carcharodontosaurus was found in Africa.
    Arcroecanthosaurus was found in North America.

    Explain the evolutionary and geological conditions that account for the similarities in their skeletons.

Reporting Category for Question 33: **Earth's Processes (pp. 231-232)**

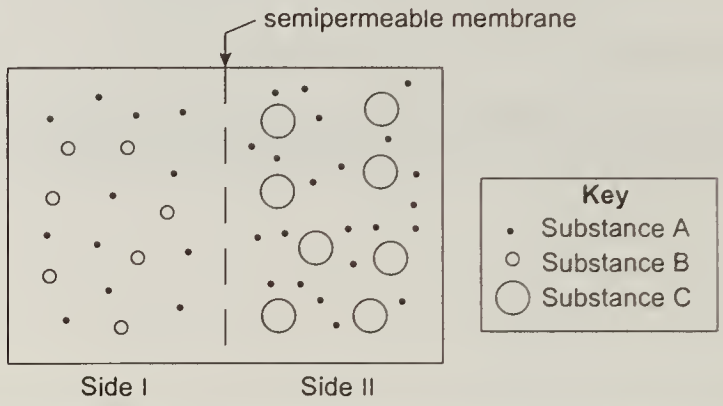
34. Study the diagram below. It represents a container that is divided by a semipermeable membrane. A different solution in its initial state is shown on each side of the membrane.

    a. Describe which molecule(s) will move through the membrane and which molecule(s) will not.

    b. Describe the relative rates at which the molecule(s) will move across the membrane.

    c. Describe in which direction the molecule(s) will move.

    d. Describe how long the molecule(s) will continue to move.



Reporting Category for Question 34: **Characteristics of Organisms (p. 230)**

Open-response Questions, Session 3

35. A tennis ball is hit over a net.

    a. Describe and diagram (using arrows) at least **three** factors that affect the motion of the tennis ball from the moment it contacts the tennis racket to the moment it is over the net.

    b. Choose **one** factor and discuss how you could change the ball or racket design to alter the effect of this factor on the motion of the ball.

Reporting Category for Question 35: **Position and Motion of Objects (p. 229)**

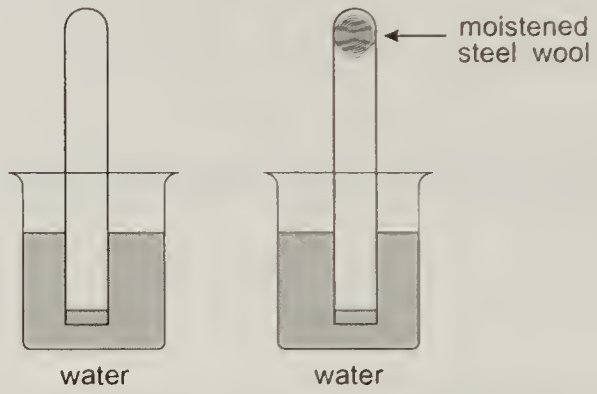
36. Examine the following sequences of DNA.

W	X	Y	Z
a	a	a	a
c	c	c	c
t	t	t	t
g	c	g	g
c	t	g	g
t	g	c	t
g	a	t	g
a	c	g	a
c		a	c
		c	

W represents a normal strand of DNA. X, Y, and Z represent potential mutations of W. Identify the type of mutation of each strand (X, Y, Z). Which mutation has the least effect on the organism? Explain why.

Reporting Category for Question 36: **Heredity and Evolution (pp. 230-231)**

37. Two identical test tubes are inverted in a beaker of water. One test tube has air inside it. The other test tube has air and a ball of moistened steel wool in it (see diagram). Assuming that temperature and pressure remain constant, predict what will happen chemically and what the system will look like after being left untouched for several weeks. You may include a drawing with your explanation.



Reporting Category for Question 37: **Designing an Investigation (pp. 227-228)**

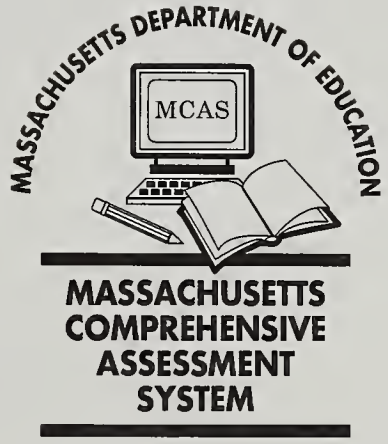
Open-response Question, Session 4

38. Although the activation of airbags during an accident has been responsible for saving many lives, they have also been cited as the cause of death to small children and adults.

    a. How might the existence of airbags in vehicles change the behaviors of the vehicle users?

    b. What design innovations would you add to a vehicle to address these behaviors?

Reporting Category for Question 38: **Science, Technology, and Human Affairs (p. 234)**



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Mathematics Tool Kit and Reference Sheets

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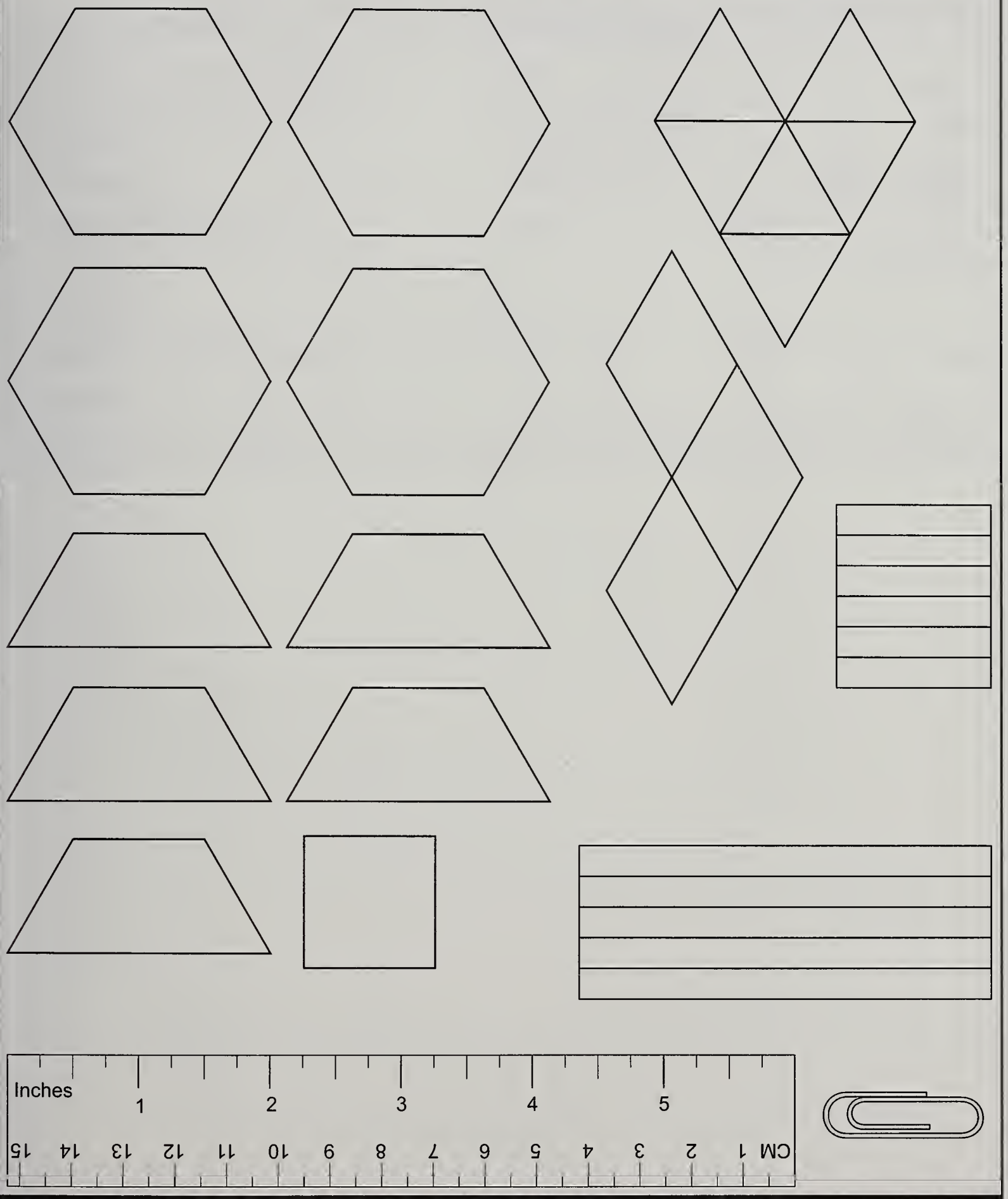
Grade 4 Mathematics Tool Kit



1997-98 Massachusetts Comprehensive Assessment System
Grade 8 Mathematics Reference Sheet

Use the information and ruler below as needed to answer questions in this test.

8 ounces = 1 cup

2 cups = 1 pint

2 pints = 1 quart

4 quarts = 1 gallon

3 teaspoons = 1 tablespoon

16 tablespoons = 1 cup

16 ounces = 1 pound

2000 pounds = 1 ton

1 mile = 1760 yards

Perimeter of triangle: $P = a + b + c$

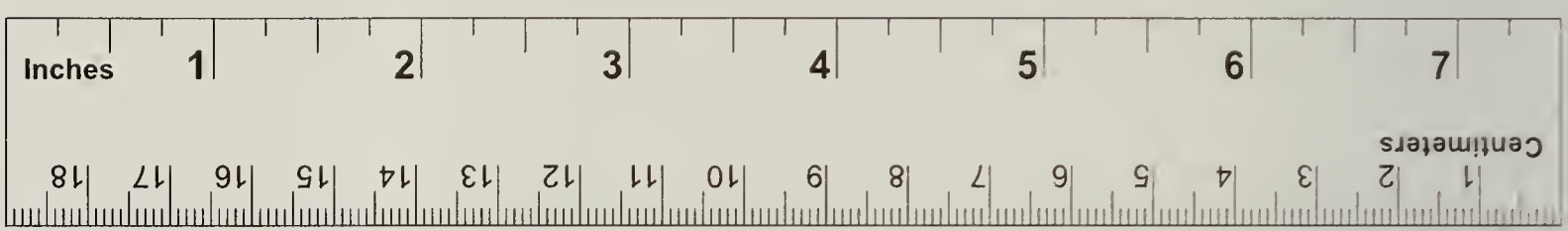
Circumference of circle: $C = 2\pi r$

OR

$C = \pi d$

Area of triangle: $A = \frac{1}{2} bh$

Area of circle: $A = \pi r^2$



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Grade 10 Mathematics Reference Sheet

AREA FORMULAS

triangle ..... $A = \frac{1}{2}bh$

rectangle ..... $A = bh$

square ..... $A = s^2$

trapezoid ..... $A = \frac{1}{2}h(b_1 + b_2)$

CIRCLE FORMULAS

$C = 2\pi r$

$A = \pi r^2$

SURFACE AREA FORMULAS

sphere ..... $SA = 4\pi r^2$

cube ..... $SA = 6e^2$

cylinder ..... $SA = 2\pi r^2 + 2\pi rh$

VOLUME FORMULAS

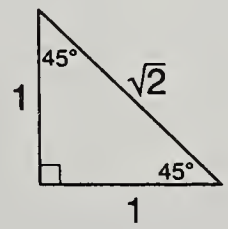
cube ..... $V = e^3$

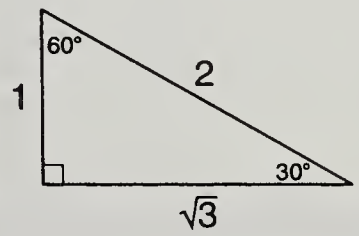
cylinder ..... $V = \pi r^2 h$

cone ..... $V = \frac{1}{3}\pi r^2 h$

regular prism ..... $V = Bh$ (B = area of the base)

sphere ..... $V = \frac{4}{3}\pi r^3$

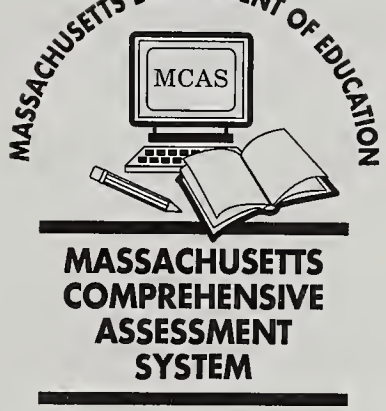




[back of Grade 10 Mathematics Reference Sheet]

Values of the Trigonometric Functions

Angle	Sin	Cos	Tan	Angle	Sin	Cos	Tan
1°	0.0175	0.9998	0.0175	46°	0.7193	0.6947	1.0355
2°	0.0349	0.9994	0.0349	47°	0.7314	0.6820	1.0724
3°	0.0523	0.9986	0.0524	48°	0.7431	0.6691	1.1106
4°	0.0698	0.9976	0.0699	49°	0.7547	0.6561	1.1504
5°	0.0872	0.9962	0.0875	50°	0.7660	0.6428	1.1918
6°	0.1045	0.9945	0.1051	51°	0.7771	0.6293	1.2349
7°	0.1219	0.9925	0.1228	52°	0.7880	0.6157	1.2799
8°	0.1392	0.9903	0.1405	53°	0.7986	0.6018	1.3270
9°	0.1564	0.9877	0.1584	54°	0.8090	0.5878	1.3764
10°	0.1736	0.9848	0.1763	55°	0.8192	0.5736	1.4281
11°	0.1908	0.9816	0.1944	56°	0.8290	0.5592	1.4826
12°	0.2079	0.9781	0.2126	57°	0.8387	0.5446	1.5399
13°	0.2250	0.9744	0.2309	58°	0.8480	0.5299	1.6003
14°	0.2419	0.9703	0.2493	59°	0.8572	0.5150	1.6643
15°	0.2588	0.9659	0.2679	60°	0.8660	0.5000	1.7321
16°	0.2756	0.9613	0.2867	61°	0.8746	0.4848	1.8040
17°	0.2924	0.9563	0.3057	62°	0.8829	0.4695	1.8807
18°	0.3090	0.9511	0.3249	63°	0.8910	0.4540	1.9626
19°	0.3256	0.9455	0.3443	64°	0.8988	0.4384	2.0503
20°	0.3420	0.9397	0.3640	65°	0.9063	0.4226	2.1445
21°	0.3584	0.9336	0.3839	66°	0.9135	0.4067	2.2460
22°	0.3746	0.9272	0.4040	67°	0.9205	0.3907	2.3559
23°	0.3907	0.9205	0.4245	68°	0.9272	0.3746	2.4751
24°	0.4067	0.9135	0.4452	69°	0.9336	0.3584	2.6051
25°	0.4226	0.9063	0.4663	70°	0.9397	0.3420	2.7475
26°	0.4384	0.8988	0.4877	71°	0.9455	0.3256	2.9042
27°	0.4540	0.8910	0.5095	72°	0.9511	0.3090	3.0777
28°	0.4695	0.8829	0.5317	73°	0.9563	0.2924	3.2709
29°	0.4848	0.8746	0.5543	74°	0.9613	0.2756	3.4874
30°	0.5000	0.8660	0.5774	75°	0.9659	0.2588	3.7321
31°	0.5150	0.8572	0.6009	76°	0.9703	0.2419	4.0108
32°	0.5299	0.8480	0.6249	77°	0.9744	0.2250	4.3315
33°	0.5446	0.8387	0.6494	78°	0.9781	0.2079	4.7046
34°	0.5592	0.8290	0.6745	79°	0.9816	0.1908	5.1446
35°	0.5736	0.8192	0.7002	80°	0.9848	0.1736	5.6713
36°	0.5878	0.8090	0.7265	81°	0.9877	0.1564	6.3138
37°	0.6018	0.7986	0.7536	82°	0.9903	0.1392	7.1154
38°	0.6157	0.7880	0.7813	83°	0.9925	0.1219	8.1443
39°	0.6293	0.7771	0.8098	84°	0.9945	0.1045	9.5144
40°	0.6428	0.7660	0.8391	85°	0.9962	0.0872	11.4301
41°	0.6561	0.7547	0.8693	86°	0.9976	0.0698	14.3007
42°	0.6691	0.7431	0.9004	87°	0.9986	0.0523	19.0811
43°	0.6820	0.7314	0.9325	88°	0.9994	0.0349	28.6363
44°	0.6947	0.7193	0.9657	89°	0.9998	0.0175	57.2900
45°	0.7071	0.7071	1.0000	90°	1.0000	0.0000	—



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